

## **Abstract**

Title of Dissertation:       ASSOCIATION OF LIFE EVENTS WITH DEPRESSIVE  
                                      SYMPTOMS AMONG PUERTO RICAN YOUTH

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**BACKGROUND:** Early onset depressive symptoms have amplifying effects on the course of later depression, and serious personal, social and economic consequences throughout the life course. Little has been published regarding socio-demographic determinants of depression and possible mechanisms for the development of depressive symptoms among Puerto Rican youth. This study aims to examine the extent to which life events are associated with the development of depressive symptoms, and how place of residence, parental support, youth self-esteem and youth coping modify that association.

**METHODS:** Secondary analyses were performed of data from the longitudinal Boricua Youth Study (three annual waves between 2000-2004). The sample consisted of 10-13 year old Puerto Rican youth living in New York and Puerto Rico with no depressive

symptoms at wave 1, and complete information on depressive symptoms (DISC Predictive Scale which includes 9 significant predictors of depression) at waves 2 and/or 3.

**RESULTS:** Depressive symptoms increase across waves with an increase in total, negative, or positive life events in general; and social adversity, death, and family environment life events specifically. Youth with low coping consistently had a higher number of depressive symptoms than youth with high coping regardless of number of total, negative or positive life events. Youth support from parents was found to be a significant confounder for all types of life events. Parent coping was a significant confounder for social adversity events.

**DISCUSSION:** This study identifies various kinds of life events as risk factors that contribute to the development of depressive symptoms. Early onset depressive symptoms have amplifying effects on the course of later depression, and serious personal, social and economic consequences throughout the life course. Preventing the development of depressive symptoms at an early age should be a priority if we want to optimize the mental health and well-being of youth so that they can reach their full potential. Our findings could inform the development of a first-stage screening tool for youth at risk of developing depressive symptoms in community settings.

**ASSOCIATION OF LIFE EVENTS WITH DEPRESSIVE SYMPTOMS AMONG  
PUERTO RICAN YOUTH**

by

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## **Foreword**

While working as a community organizer I became fascinated by the energy and optimism that immigrants bring into this country and infuse at every level of a community. I worked helping immigrants connect with their new world and organized educational, art programs and health program for their families. While some children were alienated from their parents, schools and neighborhoods, the majority of children thrived despite their sometimes chaotic lives. Many families endured poverty, discrimination, fear, abuse, and isolation but for the most part they became enmeshed in the fabric of our communities and prospered. Those observations became the inspiration for this dissertation.

## **Dedication**

I dedicate this dissertation to my husband who supported and cheered me on throughout the process to keep me happy, and to my children who encouraged and motivated me to continue.

## **Acknowledgments**

I want to thank my Dissertation Committee members for their support and advice. I want to thank my advisor, Dr. Olivia Carter-Pokras for her patience and help to get me through the process, and Dr. Sandra Hofferth for guiding me through the proposal's revisions during the summer of 2012 and her continued mentorship. I want to thank Dr. He for his patience with my multiple biostatistics questions and I will miss sitting in his office discussing concepts, and I also want to thank Dr. Lee for her interest and thoughtful comments. Lastly, I want to thank Dr. Canino, who joined my committee at a later time but answered all my questions so graciously and kindly. I hope to meet her in person soon.

I also want to thank the leadership at the Maryland Population Research Center for the traineeship they awarded me for the year 2010-2011 which allowed me to perform exploratory work on residential mobility and depression.

## Table of Contents

Abstract .....	1
ASSOCIATION OF LIFE EVENTS WITH DEPRESSIVE SYMPTOMS AMONG PUERTO RICAN YOUTH.....	3
Foreword .....	ii
Dedication .....	iii
Acknowledgments.....	iv
Table of Contents .....	v
List of Tables .....	vii
List of Figures .....	ix
List of Abbreviations .....	xi
Chapter 1 – Introduction .....	1
Adolescent Depression.....	1
Epidemiology of Adolescent Depression.....	2
The Cost of Adolescent Depression.....	3
The Course of Adolescent Depression.....	3
Developmental Perspectives in Depression .....	<b>Error! Bookmark not defined.</b>
Depression among Latino Adolescents.....	6
Depression among Puerto Rican Adolescents .....	7
Stress and Stressful Events .....	9
Stressful Events and Depression.....	10
Effect Modifiers of the Association between Stressful Events and Depression .....	13
Stressful Events, Coping and Depression .....	13
Stressful Events, Social Support and Depression .....	14
Place of Residence and Depression .....	15
Theoretical Framework .....	17
Main Research Question .....	19
Structure of this Document .....	19
Chapter 2 – Methodology .....	21
Overall Study Design and Data Source .....	21
Participants and Criteria for Selection .....	23
Dependent/Outcome Variable and Potential Measurement Issues .....	25
Independent Variable and Potential Measurement Issues .....	29
Potential Confounders and Effect Modifiers .....	37
Power analysis .....	43
Statistical Analyses .....	44
Human Subjects .....	52
Chapter 3 - Association of life events and depressive symptoms among Puerto Rican Youth.....	54
Abstract .....	55



Introduction.....	56
Methods.....	59
Data Analysis .....	65
Results.....	67
Discussion .....	70
Tables .....	75
Chapter 4 – Association of Separation, Death, and Social Adversity with Depressive Symptoms among Puerto Rican Youth.....	81
Abstract .....	82
Introduction.....	83
Methods.....	85
Data Analysis .....	90
Results.....	91
Discussion .....	93
Tables .....	96
Chapter 5 – Association of Child Maltreatment with Depressive Symptoms among Puerto Rican Youth .....	101
Abstract .....	102
Introduction.....	103
Methods.....	105
Data Analysis .....	111
Results.....	113
Discussion .....	114
Tables .....	117
Chapter 6 - Conclusions and public health significance: Policy implications and long term relevance .....	119
References.....	123
Appendix 1.....	123
Appendix 2.....	125
Appendix 3.....	126
Appendix 4.....	132
Appendix 5.....	133

## **List of Tables**

### **Chapter 2**

Table 2.1. Participant's wave completion patterns

Table 2.2. Number of participants by wave and missing wave pattern in manuscripts 1 and 2

### **Chapter 3**

Table 3.1. Socio-Demographic Characteristics, and Individual and Family Resources at Wave 1 for 10-13 Year Old Youth without Depressive Symptoms by Geographic Area (weighted)

Table 3.2. Log-Linear Poisson Regressions of Number of Total Life Events, Negative Life Events, or Positive Life Events in the last 12 Months (at waves 1 or 2) on Depressive Symptoms (at waves 2 or 3 respectively)

### **Chapter 4**

Table 4.1. Mean Depressive Symptoms (wave 2) by Socio-Demographic Characteristics (wave 1) and Types of Life Event (wave 1) for 10-13 Year Old Youth without Depressive Symptoms at Wave 1 (weighted)

Table 4.2. List of Life Events used by the Boricua Youth Study Categorized by Type of Life Events

Table 4.3. Log-Linear Regressions of Separation, Death, and Social Adversity Events in the Last 12 Months and Depressive Symptoms

## Chapter 5

Table 5.1. Socio-Demographic Characteristics and Mean Depressive Symptoms for  
10-13 Year Old Puerto Rican Youth with No Depressive Symptoms at Wave 1

Table 5.2. Log-Linear Poisson Regressions of Lifetime Child Maltreatment (Wave 1)  
on Depressive Symptoms (Wave 3)

## **List of Figures**

### **Chapter 2**

Figure 2.1. Distribution of Depressive Symptoms at Wave 2 in the Study Sample

Figure 2.2. Distribution of Depressive Symptoms at Wave 3 in the Study Sample

Figure 2.3. Distribution of Total Life Events in the Study Sample

Figure 2.4. Distribution of Negative Life Events in the Study Sample

Figure 2.5. Distribution of Positive Life Events in the Study Sample

Figure 2.6. Distribution of Social Adversity Life Events in the Study Sample

Figure 2.7. Distribution of Separation Life Events in the Study Sample

Figure 2.8. Distribution of Death Life Events in the Study Sample

Figure 2.9. Distribution of Family Life Events in the Study Sample

Figure 2.10. Model of the Hypothetical Relations between Confounders, Effect Modifiers, Life Events, and Depressive Symptoms

### **Chapter 3**

Figure 3.1a. Mean Depressive Symptoms (wave 2) and Number of Total, Negative, and Positive Life Events by Level of Youth Coping at (wave 1) for Youth 10-13 Years with No Depressive Symptoms at Wave1

Figure 3.1b. Mean Depressive Symptoms (wave 3) and Number of Total, Negative, and Positive Life Events by Level of Youth Coping at (wave 2) for Youth 10-13 Years with No Depressive Symptoms at Wave1

### **Chapter 4**

Figure 4.1. Mean Depressive Symptoms (wave 2) by Types of Life Event (wave 1)  
for 10-13 Year Old Youth with No Depressive Symptoms at Wave 1

## **List of Abbreviations**

ADHD: Attention Deficit Hyperactivity Disorder

ANCOVA: Analysis of covariance

BYS: Boricua Youth Study

DPS: DISC Predictive Scale

DS: Depressive Symptoms

DISC-IV: Diagnostic Interview Schedule for Children, Version IV

DISC-P: Diagnostic Interview Schedule for Children, Parent Version

DISC-Y: Diagnostic Interview Schedule for Children, Youth Version

DSM-IV: Diagnostic and Statistical Manual of Disorders, Version IV

GED: General Education Development

GLM: Generalized Linear Model

LEC: Life Event Checklist

MECA: National Institute of Mental Health Methods for the Epidemiology of Child and Adolescent Mental Disorders

NCANDS: National Child Abuse and Neglect Data System

PSU: Primary Sampling Unit

SRE: Schedule of Recent Experiences

SRSS: Social Readjustment Rating Scale

SAS: Statistical Analysis System

STATA: Statistical software package developed by Stata Corp

SUDAAN: Statistical software package developed by RTI International

TEQ: Traumatic Experiences Questionnaire

## **Chapter 1 – Introduction**

Little has been published regarding the development of depressive symptoms between childhood and adolescence among Puerto Rican children (1). This study aims to further understand the complex relationship between life events and depressive symptoms among 10-13 years old Puerto Rican youth, and the potential modifying role of youth coping, youth support from parents, youth self-esteem, and place of residence (Bronx, New York, and San Juan, Puerto Rico). Greater knowledge of the risk factors for depression would improve the specificity of evaluation, diagnosis and treatment of depression in mental health services for adolescents. Comparing Puerto Rican children living in South Bronx, New York to children living in San Juan, Puerto Rico represents an opportunity to examine the association between life events and depressive symptoms in two culturally similar populations who live in different environments (2).

### *Adolescent Depression*

Depression is the leading cause of disability among adults in the U.S., and is projected to become the second cause of disability in the world by 2020 (3). Although adult depression has been recognized as a disease since ancient times, the field of child and adolescent psychiatry is relatively new and only became established over the past thirty years (4). The 1999 landmark U.S. Surgeon General's report on Mental Health encouraged continued research in the area of child and adolescent mental health, and motivated stakeholders to establish several initiatives to address the lack of national

statistics(5).As a result, two national surveys were created to monitor: 1) children's symptoms, impairment, and service use; and 2) services used by children, the costs of those services, and how benefit coverage affects service use and costs (6). In addition, the National Comorbidity Survey – Adolescent Supplement was developed to assess the mental health of youth ages 13-18 years by incorporating a broad range of DSM-IV disorders (7).

### *Epidemiology of Adolescent Depression*

Depression is rare in childhood but one of the most common mood disorders (major depressive, dysthymic, and bipolar disorders) among adolescents with a high recurrence rate in adulthood (8). About one in five adolescents in the U.S. has a psychiatric disorder (most common among adolescents are anxiety, behavior, mood, and substance abuse) by the end of adolescence, and lifetime prevalence of depression ranges from 4% to 25% depending on the study(9-13). Results from the National Comorbidity Survey Replication – Adolescent Supplement (the first nationally representative survey of adolescents 13 to 18 years old) show that the lifetime prevalence of all psychiatric disorders among adolescents ages 13-18 is 22.2%, while the lifetime prevalence of mood disorders is 14.3%(11). The results also show that the prevalence of either major depression or dysthymia increases between early and late adolescence, almost doubling between ages 13-14 (8.3%) and 17-18 (15.4%). Despite recent research that shows that half of all lifetime psychiatric disorders have their onset during adolescence, epidemiological data



on child and adolescent mental health remain scarce in comparison to adult mental health data (10).

### *The Cost of Adolescent Depression*

Depressive disorders in adolescence are strongly associated with psychiatric comorbidity, school failure, social difficulties, the adoption of risky behaviors, obesity, physical impairment and suicide(14-17). In addition, early onset depressive symptoms (18, 19), depression and comorbidity lead to serious depressive disorders and major functional impairment in adulthood (8, 9, 20-23)that result in serious personal, social and economic costs (\$57.5 billion total expenditure for mental disorders in 2006)(3).

### *The Course of Adolescent Depression*

The development of psychopathology and specifically of child and adolescent depressive disorders (depression and dysthymia) are influenced by many biological, individual, family, social and contextual factors(24, 25). These factors lead to different age of onset, duration, severity, and remission and relapse rates over the life-course (8).The mean length of an episode of major depressive disorder is approximately 6-9 months (22, 26), remission of approximately 90% of major depressive episodes takes place 1.5 to 2 years after the first onset (27-29), with a 40% cumulative probability of recurrence after 2 years, and 70% after 5 years (30). Fergusson et. al. show that a small number of young people experience a high frequency of depressive episodes with close to 4% of the group reporting 10 or more episodes of depression between ages 16 and 21(31). Among all

characteristics of depression, the early age of onset has the greatest impact on individuals by affecting them for a longer proportion of their lifetime and influencing their social development and life course transitions (9). Harrington et. al. found that 60% of individuals with child or adolescent onset depression experienced one or more depressive episodes in adulthood, compared to 27% individuals with no depression (13). In addition, approximately 5% of adolescents who had a depressive episode experienced another episode within 6 months, 12% had a second episode within 12 months and 33% within 4 years (22). Most importantly, depressive symptoms in adolescence are important predictors of depressive disorders in early adulthood (32) .

In a 2002 meta-analysis of 310 studies using the Children's Depression Inventory among children and adolescents 8 to 16 year old, Twenge (33) found that depression increased with age during adolescence. Several prospective studies agree that the average age of onset for major depression and dysthymia takes place in early adolescence, between the ages of 11 and 14 (11, 34-36). A review by Kessler based on the National Comorbidity Survey - Replication (the first nationally representative community survey of mental health in the United States) shows that significant risk for major and minor depression starts in the early teens (13-14 years old) and continues to increase almost linearly through young adulthood (9).

There are marked gender differences in the age of onset and the rates of depression. Research on adolescent depression agrees that girls start exhibiting more depressive symptoms than boys in adolescence (33, 37). For example, the odds of current and

lifetime depression are 2-3 times higher for girls than for boys and these differences in odds persist into adulthood (30, 38-40). Twenge found in his meta-analysis that girls' scores remained stable between ages 8 to 11 and then increased between ages 12 and 16 whereas boys' scores remained constant between ages 8 to 16 (33).

The etiology of depressive disorders and in particular depression depends on a complex interaction between genes and the environment (41). This interaction creates a situation in which children of depressed parents not only inherit a genetic vulnerability for the disorder but also have to interact with the environment of parental dysfunction (42, 43). Several studies, including twin studies, suggest that children of depressed parents are more sensitive to environmental stressors and are at greater risk to develop a diagnosable mental disorder (44). For example, Birmaher found that children of depressed parents are three times more likely to have a lifetime episode of major depression (30), while Zubenko and colleagues found that the prevalence of depression among study subjects (adults ages 18 and over) was 7.7 times greater in first-degree relatives and 3.8 greater in more distant relatives (45). More importantly, familial transmission of early onset recurrent depression is stronger than familial transmission of depression in general due to the shared environment (46).

### *Developmental Perspectives in Depressive Symptoms*

Research indicates that the experience of a high number of depressive symptoms in adolescence is a risk factor for developing depressive disorders in adulthood (32). The

prevalence of depressive symptoms increases with age for some adolescents while it remains the same or decreases for other individuals (47). Stoolmiller et al. found that youth with persistent depressive symptoms not only had a higher mean level of symptoms but that the symptoms were stable over time (48). Garber et al. found that about a third of children with a high number of depressive symptoms reported the same level of depressive symptoms 6 to 24 months later (49).

Although studies generally show that depressive symptoms increase with age, there is no consensus about the developmental trajectories depressive symptoms follow. Stoolmiller et al. (2005) found that pre-adolescent boys experience more depressive symptoms compared to girls but that girls experience a greater increase in depressive symptoms during adolescence while depressive symptoms among boys remain stable (48). Saluja et al. (2004) found similar results with girls having a higher number of depressive symptoms than boys and a greater increase during adolescence. Dekker et al. (2007) also found that depressive symptoms among boys decreased during adolescence .

### *Mental Health among Latino Adolescents*

The Latino population is projected to almost triple by 2050 to 132.8 million, doubling its share of the population to 30%. Estimations project that by 2020, 40% of the U.S. children will be of Latino origin (50). Few studies have been published on the mental health of Latino youth, most studies group together Latino subpopulations, or have too small sample sizes for different Latino subgroups, or fail to study important demographic

variables such as generation status or degree of acculturation (51). In 2001, a Surgeon General's Report regarding health disparities in mental health concluded that Latino children and adolescents are at significantly higher risk for negative mental health outcomes (52). Then 2001-2004 National Comorbidity Survey - Adolescent Supplement found higher rates of mood disorders among 13 to 18 year old Latino children compared to other populations (11). A 2009 Youth Risk Behavior Survey found that 32.1% of Latino youth were more likely to have felt sad or hopeless in the previous 12 months than 28.5% of youth nationwide, and 14.8% of Latino youths had contemplated suicide (one of the strongest indicators of depression) compared to 8.4% nationwide (53).

Although Latino adolescents have been found to represent a growing high risk group for poor mental health outcomes including depression, Latino adolescents remain relatively under-represented in mental health research. This lack of knowledge has direct repercussions on the development and implementation of prevention and treatment programs that are culturally informed and effective (54, 55).

#### *Depression among Puerto Rican Adolescents*

Presently, Puerto Ricans constitute the second largest group of Latinos living in the United States (9.2% of the Latino population) with persons of Mexican origin comprising the largest group (64% of the Latino population)(50). According to the U.S. Census Bureau, there are approximately 3.7 million Puerto Ricans living in the Commonwealth of Puerto Rico and approximately 4.6 million living in the 50 states and the District of Columbia(50). Puerto Ricans have a predominantly low socioeconomic status: about 44%

Puerto Ricans in the Commonwealth of Puerto Rico (referred from now on as the island) and 24% in the 50 states and the District of Columbia live in poverty compared to 15.3% in the general U.S. population (56, 57). The median household income for Puerto Ricans is \$19,800 on the island, and \$38,010 in the 50 states and the District of Columbia compared to \$50,046 in the general U.S. population. The unemployment rate of Puerto Ricans is 18.9% on the island, and 15.0% in the 50 states and the District of Columbia compared to 9.6% in the general U.S. population. Of all the Latino subgroups, Puerto Ricans have some of the worst health outcomes reporting higher fair or poor self-assessed health status, more disability and more hospitalizations compared to other Latino groups(1). In addition to higher poverty and unemployment rates, adult Puerto Ricans have higher rates of female householders with no spouse present compared to the general U.S. population (56-58), all characteristics that threaten the stability of the family and are directly associated with increased risk for mental health disorders among children and adolescents (59).

In 2010, a report indicated that Puerto Ricans were the most disadvantaged group in New York with lower rates of school enrollment, educational attainment, and employment compared to all other racial/ethnic groups (60). Results from the 2011 Youth Risk Behavior Surveillance System from Puerto Rico show that 30.6% Puerto Rican youth grades 9-12 had *felt sad or hopeless for 2 or more weeks in a row so they stopped doing some usual activities*, compared to 24.7% of black youth and 27.2% of white youth in the U.S. (61). Puerto Rican children and adolescents have some of the worst health outcomes

for Type 1 diabetes (62), asthma (63), obesity (64), and teenage childbearing (65) compared to other Latino groups and the general U.S. population.

Relatively little is known about the mental health of Puerto Rican youth living in the U.S. compared to several studies of youth living in Puerto Rico. The National Institute of Mental Health Methods for the Epidemiology of Child and Adolescent Mental Disorders (MECA) study of 1996 found that children living in Puerto Rico exhibit higher levels of psychiatric disorders than other U.S. populations (66). Canino et al. found that among 4 to 17 year old children living in Puerto Rico, the prevalence of major depression was 4.1% (67). In a study that compares Puerto Rican youth living in New York and Puerto Rico, Ramos et al. found that youth in New York had higher levels of internalizing symptoms, including depressive symptoms than youth living in Puerto Rico (68). These differences were accounted for by the experience of discrimination and exposure to violence within the two different contexts.

### *Stress and Stressful Events*

Selye's definition of stress as "a non-specific response of the body to any demand" stimulated research on the body's response to stress in terms of a general adaptation syndrome in which the organism may experience a range of physiological changes in preparation to dealing with a perceived threat (69). Later, Lazarus defined stress as a transaction between an individual and the environment (70). Stress is implicitly understood as the result of experiencing events or situations that are seen by the individual as threatening or 'stressful'. It follows that the stressful nature of an event

(stressor) within the context of the environment is dependent on the person's perception of the event as threatening or nonthreatening. A stressful event is "any response to a situation that taxes the individual's adaptive resources." A stressful life event is then conceived as an event that is cognitively appraised by the individual as a negative or unpleasant experience.

### *Stressful Events and Depression*

The stressful life events literature has focused on separate characteristics of events and how they affect individuals. Two competing concepts regarding the association between life events and depression have been proposed. Holmes and Masuda considered life events as having a cumulative effect with strong etiologic implications for mental health that are independent of predisposing characteristics (65). As events accumulate, they reach a crisis level that elicits adaptive responses that then lead to disease. Other researchers assign weights to life events based on the significance that each life event had for the individual (71). Certain life events are defined as 'undesirable' and consistently judged to be more stressful across age groups, socio-economic status, race, religion, and marital status. Stressful events are more likely to result in major depression (72). Research shows a definite relationship between negative events and an increase in mental disorders among children (73) and adolescents. Moreover, the presence of negative life events results in a slower recovery from mental disorders (74). Other categories of events that have been associated with psychopathology include uncontrollable events (75), and life threatening events (71). Several studies on the effects of natural and man-made



disasters (earthquakes, hurricanes, tsunamis) provide strong evidence that stressful events can lead to an increase in depressive, anxiety and post-traumatic stress symptoms (76, 77). However, disasters constitute extraordinary circumstances that most people will not experience because they live in relatively disaster-free environments and are more likely to encounter ordinary and frequent events that are less extreme (78). Research on the effect of 'daily hassles' shows that daily hassles constitute a better predictor of later psychological symptoms than life events in general (78, 79).

Child maltreatment (i.e. physical, sexual, and emotional abuse, and neglect) (80) is a traumatic event with significant health, social, and economic costs (81). Exposure to maltreatment has been associated with becoming depressed (82), suicidal thoughts (83), poor school performance (84, 85), criminal behavior, drug and alcohol use (86), and risky sexual behavior (87). The average lifetime cost of a non-fatal child maltreatment case in the U.S. has been estimated to be approximately \$210,000 in 2010 dollars (81). The cost includes productivity losses, and medical, child welfare, criminal justice, and special education costs.

Although not all occurrences of child maltreatment are reported, the number of officially reported cases highlights a widespread problem (88). In 2007, child protective agencies in the U.S. reported approximately 5.8 million cases of child abuse or neglect in the general population of which 3.5 million cases were screened for further evaluation (89).

Estimates from the Developmental Victimization Survey, a nationally representative sample of children 2-17 years of age, indicate that 1 in 7 children in the U.S. will

experience some form of child maltreatment in their lifetime (90). Furthermore, a report from Child Protective agencies estimate that 2.2 per 100,000 children in the U.S. will die from abuse or neglect (89).

In 2011, child maltreatment rates among Latinos (8.6 per thousand) were comparatively higher than the rates for non-Hispanic Whites (7.9 per thousand) however, Latino cases have been found to be underreported (91). Most studies use broad categories for Latinos to describe child maltreatment (92). As a result, little is known about child maltreatment in specific Latino populations with the exception of Puerto Rico which is a territory of the U.S. Puerto Rico is included in the National Child Abuse and Neglect Data System (NCANDS), a federally sponsored system established in response to the Child Abuse Prevention and Treatment Act of 1988 to collect and analyze annual data on child abuse and neglect (89). Estimates from the 2012 NCANDS indicate that there were 10 per 1,000 child victims in Puerto Rico compared to 9.2 per 1,000 in the U.S. (89)

Early research on child maltreatment focused on the effects of single types of maltreatment but more recent studies have shown that children who are exposed to one type of maltreatment are often exposed to other types (93). As a result, researchers started examining the combined effects of different types of child maltreatment and found that there is strong evidence that the effects of exposure to multiple types of maltreatment represent a substantial risk for mental health disorders (94), major depression (5 or more depressive symptoms) (86), and minor depression (2 to 4 depressive symptoms) in particular (95).

### *Effect Modifiers of the Association between Stressful Events and Depression*

Most people will experience stressful events in the course of their lives and while some people will suffer acute distress, others will recover from the stressful events without psychological repercussions. A large body of literature has established the importance of protective factors to prevent illness following a stressful event (96).

### *Stressful Events, Coping and Depression*

Adolescence is considered a period of profound cognitive, social and emotional changes (97) with rapid increases in both the experience of stressful life events and the associated increase in stress (98-100). Several studies among adolescents and adults show an association between stressful life events and depression or depressive symptoms in clinical and general population studies (101, 102). However, many depressed youth do not experience a stressful life event prior to their depression and not all youth who experience stressful life events become depressed. Successful adaptation to stress depends on the environment and the resources available to the youth to cope with the stressful life events (103). Coping has been described as a response to external demands that serve to prevent, avoid or control emotional stress (104), and as an effort to mobilize personal resources and competences to deal with internal or external demands (105, 106). Coping is not a specific behavior that can be observed but rather is a complex set of situation-specific behaviors, cognitions and perceptions that individuals use to deal with a stressful situation. Studies show that individuals use multiple strategies to cope with life

situations that depend on the life events they confront (107, 108). Coping influences the choice and/or efficiency of coping strategies used in response to stressors (109) and the way an individual copes with a situation will determine the way the individual is affected by stress (25, 110, 111). Coping skills are essential for the healthy emotional and social development of children (112).

There is little agreement on how to conceptualize and measure coping and as a result there is a multitude of domains and categories used in coping scales to describe different coping strategies (103). In 2003, Skinner (111) reviewed and critiqued over 100 coping assessments compiling a list of 400 ways of coping and 13 coping dimensions or “families of coping.” His review led him to conceptualize the structure of coping as a set of higher order categories -or coping domains- that reflect lower order categories -or ways of coping. He concluded that the confusion and lack of consensus about coping domains and ways of coping makes research results difficult to compare or aggregate. He also highlighted the need to establish precise coping domains that are functionally homogeneous and distinctive, and ways of coping categories that are conceptually clear, mutually exclusive and exhaustive.

### *Stressful Events, Social Support and Depression*

Social support is usually studied as a psychosocial resource and refers to the functions provided to an individual when they are offered instrumental, informational, emotional, and appraisal assistance (113). The different cognitive and behavioral aspects of support

are highly correlated and can usually be summarized as perceived or received social support. Research indicates that perceived emotional social support is more strongly associated with mental health than received support. Henderson reviewed numerous studies that suggest that social support moderates the influence of stressful events on depression (114). Studies indicate that the ongoing support from family members, peers and other adults help the individual to cope with a stressful event by buffering the individual from the psychological consequences of stressors (115, 116). Studies show that the presence of social support alleviates the psychological stress created by a life event and has been implicated as a protective factor for depression (117, 118). The most influential theoretical perspective on social support states that the perception of available support and the supportive actions of others reduce the effects of stressful life events on health (119). Social support research indicates that although peer group relationships are especially important in adolescence, the most psychologically beneficial relationships that show significant stress-buffer effects are supportive family relationships, particularly supportive relationships with parents (120, 121). However, the lack of consistency in social support findings reflect methodological differences, the lack of a common definition for social support (too broad, too vague, no consensus), and the diversity of measures of social support (58, 122).

#### *Place of Residence and Depression*

Many studies show that island Puerto Ricans exhibit significantly poorer physical health but better mental health than mainland Puerto Ricans and other Latino subgroups (38).

This differential in physical health may be explained by poverty rates being higher in the island compared to the mainland. For example, children living in Puerto Rico have higher rates of poverty and report worse physical and mental health compared to children living in mainland which may be due to worse access to services (38, 123). Research on internalizing disorders by Ramos-Olazagasti et al. indicate that differences in internalizing disorders among Puerto Rican youth living in the island where they are a majority, and New York where they are a minority were accounted for by experiences of discrimination and exposure to violence(124).

Place of residence can indirectly influence the development of psychological distress through processes such as personal control, social support, and stress (125). Latino adult immigrants have been found to have lower risk of lifetime depression than U.S. born Latinos, and those proficient in English (126). Immigrants also have lower rates of depression when they arrive in the U.S. but within a generation, the risk increases (127). This finding suggests that for Latinos the process of adaptation to the new culture may be responsible for the increase (128). The place of residence may become a segregated environment in which individuals are concentrated in urban, poor neighborhoods that offer minimal resources and opportunities and exposes individuals to more stressful life events (124). Among Puerto Rican adolescents, cultural stress (the distress experienced by being exposed to a different culture) has been shown to be associated with psychiatric symptoms (antisocial behavior and internalizing disorders) among youth but the strength of the association between cultural stress and psychiatric symptoms decreased over time (129).

### *Theoretical Framework*

The life-course perspective states that distinct life events at critical periods have an impact on an individual's future health. Health outcomes later in life are the result of both differential early exposures and differential developmental trajectories across the life-span (130, 131). McLeod states that the long-term developmental impact of life transitions depends on the forces of continuity and change: internal dispositions, the stability of environments, the timing and sequencing of life events, and the influence of life experiences, social relationships, the intersection of historical, family and individual time, and human agency on these events (132). It is assumed that numerous biological, environmental and social factors act independently, cumulatively or interactively across the life span to impact later health (133).

Adolescence is a critical period in an individual's development characterized by rapid pubertal and psychosocial maturation (97). Many studies show that there is an increase in depressive disorders between childhood and adolescence associated with pubertal changes (11, 134). The early onset of mood disorders disrupts the maturational process and interferes with critical life choices and long term adjustment (101).

Hill's theory of family stress states that the accumulation of acute stressors may lead families to physical, emotional or relational crises but that the impact of stressors can be buffered by protective factors. In Hill's model, there is a precipitating event (stressor)

that interacts with the family resources and the family's perception of the event and results in the outcome. Lazarus (70) describes a stressor as an event that results in stress which is defined as "disturbances of biological and psychological functioning ... brought about by unusual threatening, damaging or demanding life conditions." Those disturbances require an adaptation to the disruption/threat of an individual's well-established personal and social values. McCubbin(135) categorized the four factors that define family resources (personal, family systems, social support and coping) and notes that perception of an event needs to be viewed in the context of coping and is a critical factor in determining whether a stressor is experienced by a family and its individual family members as a crisis or not. Conger (136) further interpreted the family stress model to explain how family stressors impair the parent's mental health and the quality of their marital relationship which in turn result in less effective parenting. Problems in parenting lead to problematic child adjustment.

We based our work in chapter 5 on the ecological-transactional model developed by Cicchetti and Lynch (137). In this model, the balance between risk and protective factors present at different ecologic levels (i.e. community, family) interact to influence the course of the child's psychological development and functioning across the life-span. For example, child maltreatment is believed to disrupt the conditions that lead to normal development, and will result in maladaptive cognitive and behavioral strategies, and psychopathology (88). The model seeks to explore the ecological complexity of the child's contexts which are conceptualized as consisting of a number of levels nested within each other. There are three nested levels: the *macrosystem* of cultural beliefs and



values at the societal level that influences family functioning, the *exosystem* includes the community environment in which families and children live, play, and work, and the *microsystem* which pertains to the family environment (138).

### *Main Research Question*

The research questions for this dissertation focus on the association of life events and depressive symptoms among 10-13 year old Puerto Rican youth. First, we examine ‘total’, ‘negative’, and ‘positive’ life events to examine the effects of negative and positive appraisal of events. Second, we examine the differential effects of the number of social adversity, separation, death, and/or family environment events and depressive symptoms. Lastly, we examine the effects of single versus multiple child maltreatment on depressive symptoms. Each time we assess significant predictors and the effect modification of place of residence and youth resources (support from parents, coping, and self-esteem).

### *Structure of this Document*

Chapter 2 presents detailed information on the methodology used in the three studies. The chapter includes a discussion of each variable used in the final model, how variables were defined and measured, and the strengths and limitations of each variable.

Chapter 3 presents information for Manuscript 1. The broad objective of Manuscript 1 is to compare the longitudinal association between cumulative life events, cumulative

perception of life events and depressive symptoms among 10-13 year old Puerto Rican adolescents and possible modifying roles of youth coping, youth self-esteem, and youth support from parents.

Chapter 4 presents information for Manuscript 2. The broad objective of Manuscript 2 is to examine the longitudinal association between individual life events, types of life events and depressive symptoms among 10-13 year old Puerto Rican adolescents and the possible modifying role of the youth ways of coping, youth self-esteem, the youth support from parents, and place of residence (living on the island or on mainland).

Chapter 5 presents information for Manuscript 3. The broad objective of Manuscript 3 is to examine the longitudinal association between experiencing child maltreatment and depressive symptoms among 10-13 year old Puerto Rican adolescents and the possible modifying role of the youth coping, youth self-esteem, youth support from parents, and place of residence (living on the island or on mainland).

Chapter 6 includes information on the public health significance of the association between life events and depressive symptoms among 10-13 year old Puerto Rican adolescents as well as the policy implications and long term relevance.

## **Chapter 2 – Methodology**

### *Overall Study Design and Data Source*

The Boricua Youth Study is a longitudinal study of psychiatric disorders among Puerto Rican children and adolescents ages 5 to 13 living in the South Bronx in New York City and the San Juan and Caguas Standard Metropolitan Areas in Puerto Rico. Data from multistage probability samples were weighted to represent the target areas according to the 1990 U.S. Census and were collected at both sites over three waves between 2000 and 2004: wave 1 (2000-2001), wave 2 (2001-2002) and wave 3 (2002-2004).

### The Sampling Design

A more detailed description of the sampling design and procedures is presented by Bird et al. (139, 140). The sampling design and sampling procedures were similar in both sites (the Bronx, New York and San Juan, Puerto Rico). On the mainland, the sampling frame included all the census blocks in the geographical area designated as the South Bronx, New York City. On the island, the sampling frame included all of the census blocks in the seven municipalities that constitute the San Juan Metropolitan Area (SJMA). The primary sampling units (PSU) consisted of randomly selected household clusters (150 in the Bronx and 163 in Puerto Rico) within block groups as defined by the US Bureau of the Population and Housing 1990 Census. A secondary sampling unit was created by a random selection of households (clusters) at both sites from each primary sampling unit using sample probabilities that are proportional to the estimated number of households with children in the target ages in each primary area (block). A household was eligible if

it met the criteria of: 1) at least one child between the ages of 5 to 13 who were permanent residents at the time of enumeration; and 2) at least one parent living in the household identified himself/herself as of Puerto Rican background. Up to three eligible children per household could participate in the study. In households with more than three eligible children, children were selected at random using Kish tables. Any child with mental retardation or developmental disabilities was excluded. The original sample included 1,138 children from the Bronx and 1,353 children from Puerto Rico. Completion rates for waves 2 and 3 were 92% and 88% of the baseline sample respectively. The Wave 2 and Wave 3 follow-up interviews were conducted at 1 and 2 years after baseline respectively. Bird et al. (139) state that those who dropped out of the study after the baseline interview were found to live in more highly educated families and were more likely to be from the South Bronx sample. Ramos Olazagasti(141) conducted missing data analyses at the two follow-ups to test whether 15 background characteristics measured at baseline predicted missing status at follow-up and found that children living in single-parent households were more likely to be missing at wave 2 [ $b(SE) = 0.43(0.21)$ ,  $p < 0.05$ ].

### Procedures

Parents provided signed informed consent for their children to participate in the study while children 7 and older provided signed assent. Children and parents were interviewed at the same time by different interviewers at home. The structured in-person interviews were conducted separately with parents and children by trained lay interviewers at their

home, either in English (75.5% of parents and 95.6% of children in the Bronx were interviewed in English) or Spanish (99.5% of parents and 99.9% of children in Puerto Rico were interviewed in Spanish) depending on the respondent's preference. Audiotapes of interviews were systematically used to evaluate the quality of the interviewers. In addition, a computerized interview protocol was used to enter data automatically and avoid missing data, inappropriate skips, and out-of-range scoring. Children 10 or older at baseline had information on family socio-demographic factors, a wide range of risk factors, and child psychiatric disorders.

#### *Participants and Criteria for Selection*

My initial sample included 10-13 year old adolescents at wave 1 from South Bronx, New York City (n = 573) and San Juan, Puerto Rico (n = 655) for a total of 1,228 children. The sub-sample was chosen because measures of depressive symptoms were not administered to the younger participants (5-9 years old) due to issues of poor reliability of the Diagnostic Interview Schedule for Children, Version IV (DISC-IV) (139, 142, 143) in children younger than 10 years old (144-146).

The study examines life events at wave 1 and depressive symptoms at wave 2, and life events at wave 2 and depressive symptoms at wave 3. Table 1.1 describes all the possible wave completion patterns:

Table 1.1 Participant's wave completion patterns

<b>Manuscript</b>	<b>Wave Completion Pattern</b>	<b>Wave 1</b>	<b>Wave 2</b>	<b>Wave 3</b>
1, 2, and 3	Waves 1, 2, 3	yes	yes	yes
1 and 2	Waves 1, 2	yes	yes	no

1 and 3	Waves 1, 3	yes	no	yes
Excluded	Wave 1	yes	no	no

*Manuscripts 1 and 2:*

**Inclusion Criteria:** included a total of 977 Puerto Rican children 10-13 years old who met the following conditions: 1) no depressive symptoms at wave 1 (2000-2001); 2) participated at least in wave 1 (2000-2001) and either wave 2 (2001-2002) and/or wave 3 (2002-2004); 3) had complete life events data for both waves 1 and 2; and 4) had complete depressive symptoms data at waves 2 and 3.

**Exclusion Criteria:** excluded from the analytic sample youth with depressive symptoms at wave 1 (n=155) or youth missing life events information at wave 1 or wave 2 (n=5). We excluded children with depressive symptoms at wave 1 in order to establish a temporal sequence between life events at wave 1 and depressive symptoms at wave 2, and life events at wave 2 and depressive symptoms at wave 3. Children 5-9 years of age were excluded from the analytic sample because the instrument measuring psychiatric disorders in this age group has poor reliability (139).

Table 1.2. Number of participants by completion patterns in manuscripts 1 and 2

<b>Completion Pattern</b>	<b>Wave 1</b>		<b>Wave 2</b>		<b>Wave 3</b>	
	No DS	DS*	No DS	DS*	No DS	DS*
Waves 1, 2, 3	881	0	835	63	839	59
Waves 1, 2	79	0	74	5	-	-
Missing DS (wave 1)	17		0		0	
<b>Totals</b>	<b>977</b>		<b>977</b>		<b>898</b>	

\* At wave 1 the sample only included children with no depressive symptoms (DS)

*Manuscript 3:*

Inclusion criteria: included 855 Puerto Rican children 10-13 years old who met the following conditions: 1) had wave 1 data on maltreatment; and 2) had complete data on depressive symptoms at wave 3.

Exclusion Criteria: excluded from the analytic sample were youth with depressive symptoms at wave 1 (n=155), youth not having completed wave 3 (n=79), and youth missing information on child maltreatment (n=41). Children with depressive symptoms at wave 1 were excluded in order to establish a temporal sequence between lifetime maltreatment at wave 1 and the development of depressive symptoms at waves 3. Children 5-9 years of age were excluded from the analytic sample because the instrument measuring psychiatric disorders in this age group has poor reliability (139).

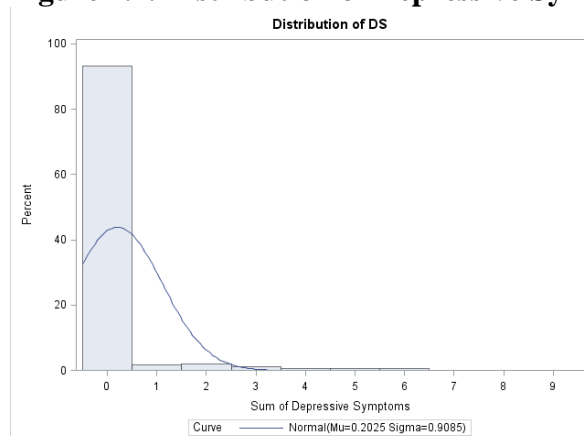
*Dependent/Outcome Variable and Potential Measurement Issues*

In the three manuscripts we used a subset of questions from the major Depression and Dysthymia schedule of the National Institute of Mental Health Diagnostic Interview Schedule for Children, Version IV (DISC-IV) (142). The DISC-IV was administered to both children and their primary parent/caregiver to obtain a combined measure of depressive symptoms. The assessment of depression in the National Institute of Mental Health's Diagnostic Interview Schedule for Children, Version IV (DISC-IV) (147, 148) is based on the Diagnostic and Statistical Manual of Disorders (DSM-IV). Both the English and Spanish versions of the DISC-IV were used in this study.

We chose to use the 9 items from the Diagnostic Interview Schedule for Children, Version IV that have been found to be significant predictors of depression (149). Lucas et al. (2001) report that the scale has good reliability (Cronbach's  $\alpha = 0.82$ ). In all manuscripts we use the count of 0 to 9 depressive symptoms in the past 12 months reported at waves 2 (2001-2002) and 3 (20002-2004) by both youth and parents/caregivers. See Appendix 1 for a list of depressive symptoms. Depressive symptoms were the combined measure of responses to symptoms of major depression in the last 12 months reported by either the child or the primary parent/caregiver (142) to capture as many counts of symptoms as possible.

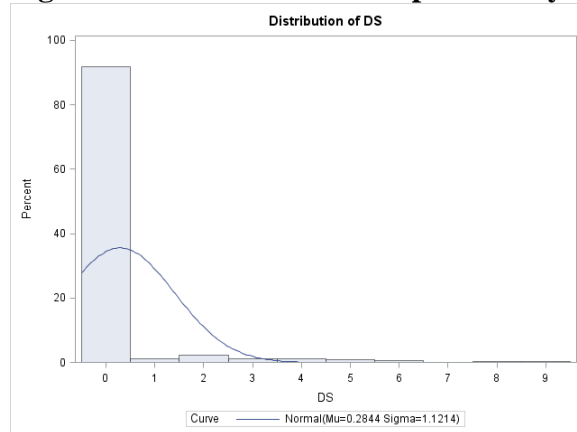
The distribution of depressive symptoms as a count variable in the study sample was skewed to the right, ranging from 0 to 9 with a mean of 0.203 (Figures 1.1 and 1.2). In manuscripts 1 and 2 the prevalence of depression (at least 5 or more depressive symptoms) at wave 1 was 4.1% which is within the range provided in community studies. Community studies using DISC-IV report prevalence rates of 0.4% to 8.3% among adolescents (30).

**Figure 1.1. Distribution of Depressive Symptoms at Wave 2 in the Study Sample**





**Figure 1.2. Distribution of Depressive Symptoms at Wave 3 in the Study Sample**



### Validity and Reliability of DISC-IV

The DISC-IV is a reliable tool widely used both in epidemiological surveys and clinical settings that provides data on psychiatric disorders and symptoms. Appendix 1 includes a description of mood disorders, shows an example DISC-IV question (major depression) and gives the list of the 9 DISC-IV questions for major depression that are used in this study. Despite the greater length and complexity of DISC-IV which classifies mental disorders according to DSM-IV diagnostic criteria and includes three time frames (last month, last 12 months, and lifetime), instead of one (last 6 months) as in DISC-2.3.(150), the DISC-IV compares favorably with DISC-2.3. Shaffer reported results on the test-retest reliability of the English version for the “last 12 month” reports. Test-retest reliability for the English version in clinical samples is moderate for parent reports of major depression ( $\kappa=.66$ ) and very good for youth reports ( $\kappa=.92$ ). Bravo reports that children 11-17 years old were less reliable informants for anxiety and depressive disorders than parents when reporting about the same disorders (143). In this study we chose to use the DISC Predictive Scale (DPS) which focuses on the 9 items that are

significant predictors of depression (149). The DPS has been used as a routine tool for the evaluation of mental disorders in children and adolescents. Lucas et al. (2001) report that the scale has good reliability (Cronbach's  $\alpha = 0.82$ ).

DISC-IV is only one of four instruments that have been translated into Spanish and only one of two instruments with psychometric data available for U.S. Latinos (151). The DISC-IV was translated into Spanish by an international team of bilingual investigators (152). The Spanish version of the major depression schedule was assessed and found to have moderate test-retest reliability for most disorders. The moderate test-retest reliability of the Spanish version was found to be similar to the English version ( $\kappa=0.48$ ) (143).

Validity has not been tested for the DISC-IV however the validity of DISC-2.3 in a community sample was moderate to very good for the English version ( $\kappa=.79$  for major depression). The DISC-IV has been used and tested for its criterion-related validity in several psychiatric studies (153-155).

#### Strengths and Limitations of DISC-IV

Some of the strengths of the DISC-IV are that to insure the accuracy of the responses, the language and sentence structure was simplified, complex questions were sub-divided into shorter, simpler questions, and children were asked several questions to clarify their responses(142). Respondent-based interviews are useful in large studies because they are usually administered by lay interviewers who use computer-assisted software, lowering the total cost of the interview. Structured interviews such as the DISC-IV are instruments

that have improved the reliability of diagnoses but a great limitation is that the validity of a diagnostic interview is no greater than the validity of the diagnosis itself(156). Also, reliability of the responses is low for children 6-9 years old (that is why we excluded children 6-9 years old from this study), and it is not possible to record atypical symptoms not described in the DSM and ICD classification. Other limitations of structured diagnostic interviews are the invalid responses (usually over-reporting) that may be given by a child who misunderstands a question or is not aware of the concept being described(142).

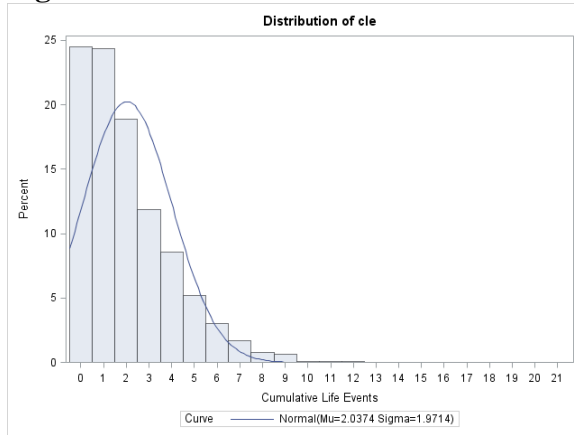
#### *Independent Variable and Potential Measurement Issues*

Life Events in the first manuscript: Life events in the preceding 12 months were based on child reports at waves 1 and 2. Three measures were developed for analysis: (1) number of 'total' life events whether identified as positive ("mostly good or no effect") or negative ("mostly bad") by the respondent (count of 20 out of 21 positive and negative life events, excluding the item 'other' life events), (2) number of 'negative' life events (positive count of life events identified as "mostly bad" by the respondent), and (3) number of 'positive or no effect' life events (positive count of life events identified as "mostly good" or "affected [the child] not at all or only a little" by the respondent). The list of life events in this study is derived from the original 46 items included in the Life Events Checklist and asks respondents to indicate if each event was positive or negative (157). Test-retest reliability was found to be substantial for both 'positive or no effect' ( $\kappa=0.69$ ) and 'negative' events ( $\kappa=0.72$ ) (158). The advantages of using checklists in community surveys are that they are brief and easy to administer. However, checklists

have several limitations related to their retrospective nature (e.g. recall bias, recall dropping over time), and how participants interpret events (e.g. questions about events are imprecise, personal disposition influences the recall of events) (159, 160). A complete list of life events can be found in Appendix 1.

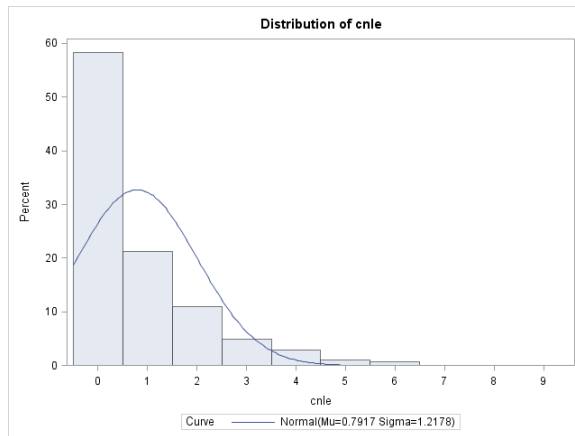
*Total Life Events:* The distribution of total life events in the study sample was slightly skewed to the right, ranging from 0 to 12 with a mean of 2.002 (SD=1.93). (Figure 1.3).

**Figure 1.3. Distribution of Total Life Events in the Study Sample**



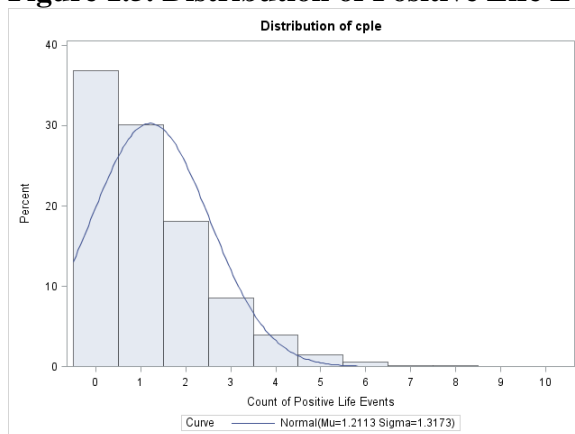
*Negative Life Events:* The distribution of negative life events in the study sample was slightly skewed to the right, ranging from 0 to 7 with a mean of 0.79 (SD=1.22) (Figure 1.4).

**Figure 1.4. Distribution of Negative Life Events in the Study Sample**



*Positive or No Effect Life Events:* The distribution of ‘positive or no effect’ life events in the study sample was slightly skewed to the right, ranging from 0 to 9 with a mean of 1.21 (SD=1.31) (Figure 1.5).

**Figure 1.5. Distribution of Positive Life Events in the Study Sample**

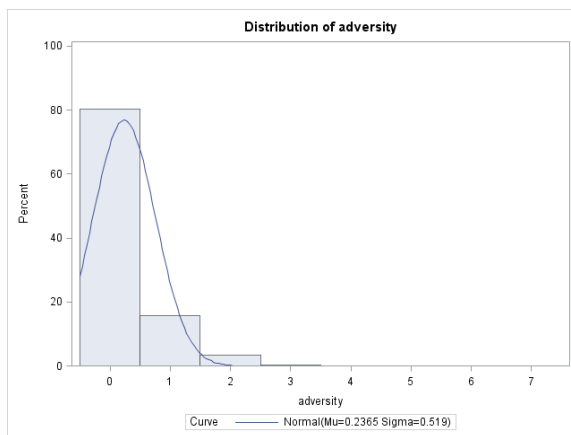


Life Events in the second manuscript: The four types of life events used in this study (e.g. separation, death, family environment and social adversity) were adapted from the research on types of life events conducted by Grover et al. (2005). A complete list of types of life events can be found in Appendix 2. Each type of life events was an

aggregate of positive responses to the life events included in that category. The life events used in this study were derived from the 46 items that were originally included in the Life Events Checklist (157).

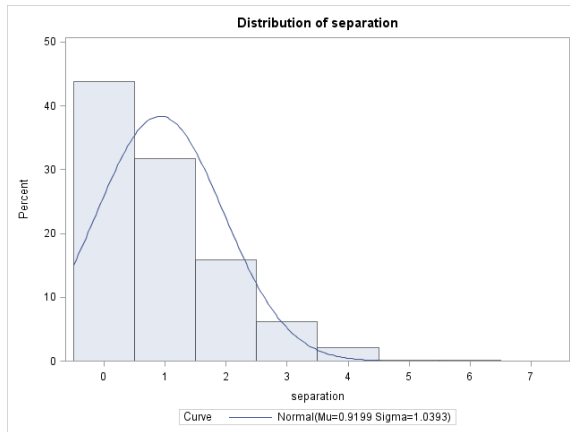
*Social Adversity Life Events:* The distribution of social adversity life events in the study sample was slightly skewed to the right, ranging from 0 to 4 with a mean of 0.24 (SD=0.52) (SD=1.31) (Figure 1.6).

**Figure 1.6. Distribution of Social Adversity Life Events in the Study Sample**



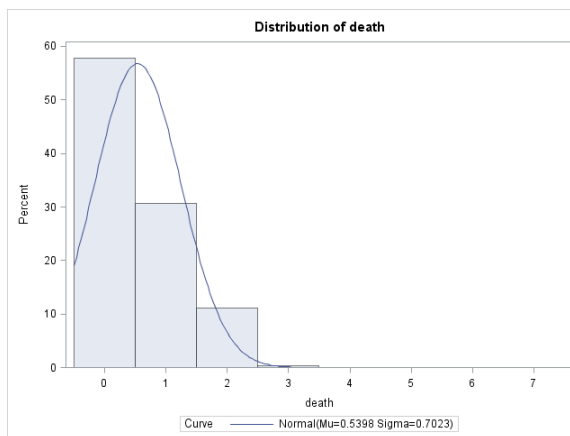
*Separation Life Events:* The distribution of separation life events in the study sample was slightly skewed to the right, ranging from 0 to 5 with a mean of 0.92 (SD=1.04) (SD=1.31) (Figure 1.7).

**Figure 1.7. Distribution of Separation Life Events in the Study Sample**



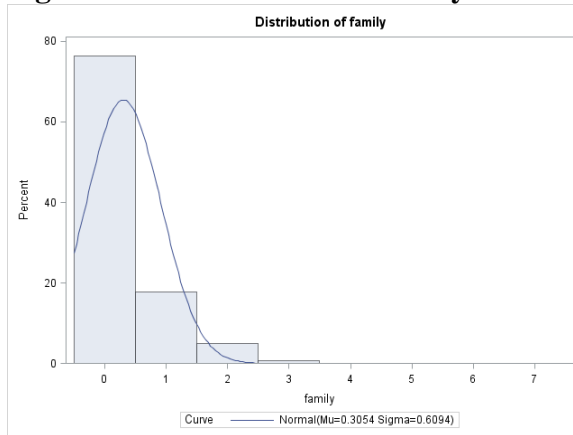
*Death Life Events:* The distribution of death life events in the study sample was slightly skewed to the right, ranging from 0 to 4 with a mean of 0.54 (SD=0.70) (SD=1.31) (Figure 1.8).

**Figure 1.8. Distribution of Death Life Events in the Study Sample**



*Family Environment Life Events:* The distribution of family environment life events in the study sample was slightly skewed to the right, ranging from 0 to 4 with a mean of 0.31 (SD=0.61) (SD=1.31) (Figure 1.9).

**Figure 1.9. Distribution of Family Environment Life Events in the Study Sample**



### Validity and Reliability of the Life Events Checklist

Positive and negative life events in the LEC have acceptable validity and test-retest reliability. In this study, when we calculated the internal consistency of the list of 20 life events we found that it was poor (Cronbach's  $\alpha=0.61$ ).

### Strengths and Limitations Life Events Checklists

There has been an ongoing debate over the advantages of checklists versus investigator-based interviews which are considered by many as the gold-standard to measure life events (161). Checklists are brief, easy to administer and provide the potential for anonymity (162). In addition, studies based on adolescent reports show good reliability estimates for negative and positive events (163). Lastly, when interview and checklist methods were compared, fair to substantial agreement between the two methods was found for the number and perceived impact of life events (162).



The potential measurement problems of life events checklists are numerous. The lack of consensus on the contents of life events checklists make comparison between studies difficult. The definition and selection of life events varies by study so checklist contents may vary in the number of items it includes but also in the items they contain. Checklists only include a limited number of events that are treated as equivalent (164) and the events may reflect a subjective appraisal that does not address the objective circumstance of the event (165). Checklists constrain the respondent to recall and report on specific events retrospectively which may introduce recall bias. In addition, the recall of the events decreases over time and the amount of events reported by respondents prior to viewing the event checklist may differ after they view the checklist (166). Determining if an event is the cause or consequence of psychopathology is particularly difficult when the onset of the psychopathology is unclear or if the psychopathology is of long duration. Using life events that are themselves signs or symptoms of depression or other mental disorders may confound the association (167). Assigning a causal effect between life events and depression incorrectly assumes that exposure to life events occurs randomly with respect to other causes of depression (164). Retrospective report of events may reflect the emotional state of the person, and the differential desire to report more stressful experiences by depressed compared to non-depressed individuals as shown by Cohen (164, 165, 168). Patients with mental disorders consider typical stressors as having greater weight than do non-disordered people (75).

Child Maltreatment: In the third manuscript a child maltreatment variable was created using the answers to 11 items from the Traumatic Experiences Questionnaire (TEQ) (see

Appendix 1). The TEQ is a combination of self-reported items from different scales that assess physical and sexual abuse, and neglect by family and/or non-family members. The child maltreatment variable was a combination of lifetime experiences of maltreatment assessed at wave1. The variable 'maltreatment' was constructed to have five levels: 'no maltreatment', 'neglect only', 'physical abuse only', 'sexual abuse only', and 'multiple maltreatment'. This five level maltreatment variable is similar to the variable used by Gonzalez-Tejera et al. (2005), and Sledjeski et al. (2009) in their studies. The reliability of sub-scales included in the TEQ was previously calculated (95) and found to be poor to good: physical abuse (Cronbach's alpha = .70), neglect (Cronbach's alpha = .47), sexual abuse (Cronbach's alpha = .55), and multiple abuse (Cronbach's alpha = .72). Physical abuse was derived from four questions from the child version of the Parental Discipline Scale (66). Physical abuse included having ever been hit by a caregiver with an object sometimes or many times, or ever been hit by a caregiver with a fist, kicked hard, beaten very hard, or purposely injured at least once. Sexual victimization included two items derived from a scale developed by Finkelhor and Dziuba-Leatherman (169), and was defined as being forced to look at or touch an adult's or older child's private parts, or having an adult or older child ever try to touch, grab, or kiss the child in a sexual way one or more times. Neglect was derived from four items in the Parental Discipline Scale (66): having ever been left alone at least two times, or left without food, necessary medical care, or having a caretaker who could not take care of the child due to substance abuse at least one time. Based on the co-occurrence of child abuse and neglect, child maltreatment was categorized into five levels depending on the type of maltreatment: no maltreatment, neglect only, physical abuse only, sexual abuse only, and multi-type maltreatment.

## *Potential Confounders and Effect Modifiers*

### Potential Confounders

In manuscripts 1 and 2, potential confounders were identified based on the theoretical framework (Hill's Theory of Family Stress) (170) and risk factors associated with life events and mood and/or other mental disorders in the Boricua Youth Study and the National Comorbidity Survey Replication - Adolescent Supplement literature. In this study, risk factors include youth's age and gender, and indicators of family socioeconomic status such as family composition (single or two-parent household), maternal education and per capita household income (11, 56, 141, 171-173). Family resources were outlined by McCubbin (135) based on Hill's Theory of Family Stress and include: personal resources (financial, educational, health resources), the family system's internal resources (how family manages stress), social support, and coping.

In manuscript 3, potential confounders were identified based on the ecological-transactional model developed by Cicchetti and Lynch (137). In this model, the balance between risk and protective factors present at different ecologic levels (i.e. community, family) interact to influence the course of the child's psychological development and functioning across the life-span. For example, child maltreatment is believed to disrupt the conditions that lead to normal development, and will result in maladaptive cognitive and behavioral strategies, and psychopathology (88).

**Age** – Integer calculated from the date of birth to the interview date for children ages 10 to 13: *What is your date of birth?* - given as month/day/year

**Gender** - Obtained at the baseline interview from observation by the interviewer:

*Boy/Girl*

**Per Capita Household Income** - Obtained from the parent report and calculated by dividing the household income by the number of residents living in the household unit at the time of the interview. The per capita household income was obtained from the household listing (0-12 household members) and parental report of income (23 income categories ranging from no income to  $\geq \$100,000$ ): *Income: Total income to \*\*\*'s household before taxes for the PAST YEAR. Please include salaries, wages, social security, welfare, and any other income for everyone living in this household. (Include child support or alimony)*

*Household listing: How many other persons, children and adults, live in the household, besides the child, biological mother, biological father, other mother figure, and other father figure?*

**Mother's Education** - Obtained from the parental demographic questionnaire (highest level completed by each parent). Mother's education was categorized as less than high school, high school or GED, and some college:(172)*How many years of schooling did [you/\*\*\*'s biological mother] complete? (In general: School=00-12; College=13-16; Graduate school=17+) Did [you/she] receive a high school diploma or GED?*

***IF YES, ASK:*** A. Did [you/she] receive a college degree (including an Associate degree) beyond high school?

**Family Composition** - Obtained at the time of the interview from the parent report. The variable was developed for the study and included 2 categories: single or two parent household. Parent was defined as biological mother (89%), biological father (1.8%); other mother and other father figure. The ‘other’ parent figure included grandmother/grandfather (4.7%), adoptive (3.0%) or step parent (0.4%), biological/adoptive sister (0.1%), aunt, cousin, other female figure (1.0%).

**Parent/Caregiver Received Social Support** - Derived from the sum to answers to three items of the Parent Social Support scale in the adult questionnaire. Three items with the best internal consistency scores in the acceptable range (Cronbach’s  $\alpha = .70$ , at wave 1) were selected by performing multiple correlation analyses (174). The three items are consistent with received social support scales discussed in the literature (128, 175, 176) and relate to how often a parent gets together with family members, how often parents attend family gatherings and how often family members take care of the respondent’s children. Response categories include 4 levels ranging from 0 = *never/once a year or less*, to 3 = *at least once a week* for all items.

**Parent/Caregiver Perceived Social Support** - Measured by one item of the Parent Social Support scale of the adult questionnaire: “In general how satisfied are you with the

amount of support that you receive in your life?” Response categories ranged from 0 = *very satisfied*, to 3 = *very unsatisfied* for all items.

**Parent/Caregiver Coping** - Count of answers to the scale of Parental Coping from the adult questionnaire. The scale consists of 8 items such as “Have you felt that you were unable to control the important things in your life?” (reverse coded to unify the scale in the same direction) and “Have you successfully dealt with irritating life hassles?”. The internal consistency of the scale was calculated (Cronbach’s  $\alpha = .70$ , at wave 1) to establish its reliability and was found to be acceptable (174). Response categories included 3 items ranging from 0 = *almost never* to 2 = *often* for all items.

**Maternal Depression** - Assessed through the parent’s report. Information on maternal depression was obtained from an adaptation of the depression schedule of prime maternal depression from Spitzer (177). The variable is dichotomized as indicating the presence or absence of maternal depression in the last 12 months.

#### Potential Effect Modifiers

Potential effect modifiers tested in the three manuscripts included place of residence, youth support from parents, youth coping, and youth self-esteem.

**Place of Residence** - Based on the interviewer’s report in the Profile section of the child questionnaire and were either South Bronx, New York or San Juan, Puerto Rico.

Place of residence has been found to influence patterns of internalizing disorders (178).

**Youth Support from Parents** - Derived from positive count of answers to the Parent/Child Relationship scale of the child questionnaire and measured at waves 1 and 2. The Parent/Child Relationship scale consisted of 12 items (e.g. “How often do your parents/caretakers help you make important decisions?”) and had good reliability when calculated for this study (Cronbach’s  $\alpha = .74$ , at wave 1). Responses consisted of 2 categories, where 0 = *rarely or never* and 1 = *sometimes or often* for all items. Based on the sample distribution, Youth support from parents was categorized into three levels (low= <9 items, moderate= 9-11 items, high= >11 items).

One limitation of social support measurement is the lack of a gold standard so it is difficult to draw conclusions across studies about the effects of social support on mental health. Another limitation is the variability of support over time and the difficulty of assessing those variations and the impact they have on depression (120).

**Youth Coping** - Assessed through the Ways of Coping scale of the child questionnaire (179) which included nine items at baseline. For this study we selected five items to represent five coping styles. These five coping styles appeared in 25-50% of the approximately 100 coping systems reviewed by Skinner (111) and were used in scales with children, adolescents, and adults. Coping was only measured at wave 1 (trait coping) and was treated both as a count variable and was also dichotomized (low= <3 items, and high=  $\geq 3$  items) based on the weighted sample mean (3.28 items). It included items such as “When you have a problem... you do what you have to do to solve it?” Responses in

the child questionnaire consisted of two categories, where 0 = *rarely or never* and 2 = *sometimes or often* (the latter category was recoded as 1 for the purpose of the analyses). Cronbach's alphas were calculated for several combinations of the Ways of Coping items but dropping items did not improve the coefficients and a decision was made to use the full scale. The full scale had low reliability (Cronbach's  $\alpha = .45$ , at wave 1) possibly because the scale was not developed for Latino populations and may not be as reliable for that population (28). However, we retained this scale because it has a theoretical base, and results can be compared with other Boricua Youth Study research (180).

One of the main limitations to measuring 'ways of coping' is the large number of ways of coping that have been identified and categorized into dimensions but there is a lack of consensus on the dimensions or categories of coping (111). Also, there has been a lack of consensus in determining if coping is a process that depends on specific situations or a style that individuals use in all situations (111, 112, 181).

**Youth Self-Esteem** – Count of positive responses to eight questions from the youth Self Esteem questionnaire. The questionnaire included items related to how youth felt about themselves, how they liked the way they behaved, and if they felt as smart as other children, if they thought they were good in sports, popular among children their own age, felt that grown-ups liked them, wished they were somewhere else, and/or felt pleased with themselves. Responses to questions consisted of two categories, where 0 = *no* and 2



= *yes* (the latter category was recoded as 1 for the purpose of the analyses). We calculated the reliability of the scale and found it to be good (Cronbach's  $\alpha = .90$ , at wave 1).

### *Power analysis*

Most of the studies of the association between total life events, negative life events, or positive life events and depressive symptoms are cross-sectional. This study is longitudinal and examined total life events, negative life events, or positive life events and the association with depressive symptoms between three waves. The power calculations are based on correlations between wave 1 and wave 2 data, and between wave 2 and wave 3 data.

Ramos Olazagasti conducted a study on the contextual risks and promotive processes in internalizing trajectories among 10-13 year old Puerto Rican adolescents.(68) The study which is based on the Boricua Youth Study shows that the correlation of internalizing symptoms at three points in time varies between 0.34 and 0.48. Mean internalizing symptoms decrease from 14.62 at wave 1, to 10.23 for wave 2, and 8.22 for wave 3.

The STATA/IC 10.0 test of means for repeated measures function was used for the power calculations. The ANCOVA method was used in the power calculations because it was found to have the highest statistical power and be the method of choice when analyzing the results of baseline and follow-up results (182). The following are the results of the power calculations:

<b>Assumptions</b>	<b>Wave 1 – Wave 2</b>	<b>Wave 2 – Wave 3</b>	<b>Wave 1 – Wave 3</b>
Alpha	0.05	0.05	0.05
Mean 1 (Time 1)	14.62	10.23	14.62
Mean 2 (Time 2)	10.23	8.22	8.62
Sd1	1	1	1
Sd2	2	2	2
Sample size*	977	977	855
Correlation between F/U measurements	0.40	0.34	-
Correlation between baseline and F/U	0.34	0.48	0.48
Estimated power (ANCOVA method)	1.00**	1.00**	1.00**

\*Analytic sample of 10-13 year old youth (598=South Bronx, New York City; 673=San Juan, Puerto Rico)

\*\* Actual estimated power in STATA output

### *Statistical Analyses*

Quality assurance procedures were strictly followed throughout the dissertation project in order to maintain the highest quality of data. To minimize errors, the accuracy of the data was checked periodically before each analysis. The data were checked for variable ranges, against reference data, for typographical errors, and for logical consistency. The data were also checked for inconsistencies and missing values. Data were analyzed and the integrity of the system was maintained by protecting the data by storing it in a password protected computer with limited access.

### Descriptive analysis and diagnostics

Descriptive statistics were calculated to check for missing values, outliers and errors and to provide a quantitative description of the study population in terms of family and individual socio-demographic variables, and resources variables. Chi-square and *t*-tests were performed to examine categorical and continuous variables. In manuscript 3, GLM procedures to examine mean depressive symptoms for each categorical and continuous variables and youth support from parents. Although in manuscript 3 we treated youth support from parents as a continuous variable, we created a binary measure of youth support from parents based on the mean social support: low (<10 items) and high ( $\geq 10$  items) social support for the purpose of presenting our results. Multicollinearity between variables was assessed with tolerance scores using the standard cut off of 0.1. All tolerance values were found to be in the acceptable range between 0.97 and 0.99.

Log-linear Poisson regression models were used in manuscripts 1 and 2 to examine the association between the life events in the previous 12 months at wave 1 and reports of depressive symptoms at wave 2, and the life events in the previous 12 months at wave 2 and reports of depressive symptoms at wave 3 among youth with no depressive symptoms at wave 1. The covariates used in manuscripts 1 and 2 were from wave 1 when analyzing life events at wave 1, and from wave 2 when analyzing life events at wave 2.

In manuscript 3, we used a log-linear Poisson regression model to examine the association between lifetime maltreatment reported in wave 1 and depressive symptoms in wave 3 among youth with no depressive symptoms at wave 1. The covariates used in the third model were from wave 1.

SAS® software Version 9.3 (SAS Institute Inc., Cary, NC, USA) was used to perform variable selection. SUDAAN™ software (release 11, 2011) (183) was used to adjust standard errors for correlations resulting from the complex multistage sampling (observations nested within individuals, siblings nested within households, and households nested within census blocks). Weights were used in all analyses to adjust for the difference in probability of selection and to represent the age and gender distribution of the 2000 census. All p-values were considered significant at the  $< 0.05$  level.

#### Analysis of potential confounders and effect modifiers

##### *Potential Confounders*

Potential confounders were identified by conducting a bivariate analysis to assess their association with total, negative, or positive life events and depressive symptoms (conditional on exposure) at the  $\alpha=0.10$  level (184, 185). Once identified as potential confounders, the variables were further tested by adding them one at a time to the unadjusted model between depressive symptoms, and total life events or negative life events. A 5% change in the main effect estimates between the unadjusted and adjusted models further confirmed the variable as a confounder and was added to the final model.

##### *Potential Effect Modifiers*

Baron and Kenny identify a moderator (effect modifier) as a variable that affects the direction and/or strength of the relationship between the exposure and the outcome (186).

Log-linear Poisson distribution regression analyses were performed to examine each potential effect modifier. To test for multiplicative effect modification, we added an interaction term between the exposure and the potential moderator to the model.

In this study, only multiplicative interaction was studied. One interaction term was added at a time as we studied three variables as effect modifiers. If the interaction term was statistically significant -which meant that the variable was modifying the effect of events on depressive symptoms- it was added to the final model along with the main effect (187).

### Missing Data

Responses recorded as ‘don’t know’ or ‘refused’ (to answer) were recorded as a missing value. Only participants with waves 1, 2 and 3 information (82.06%) and participants with waves 1 and 2 information (7.12%) were included in the study for a total of 977 individuals. Participants with only wave 1 information (7.86%) or waves 1 and 3 information (2.97%) were excluded. The group of participants who were excluded from the study had more mean depressive symptoms (0.17 compared to 0.10), experienced more mean life events (2.7 compared to 2.1), included more females (53% compared to 47.4%), were slightly younger (11.7 versus 12.2), were more likely to live in a single parent homes (54.8% compared to 44%), were more likely to live in the Bronx (93.2% compared to 86.5%), had higher per capita household income (\$4,458 compared to

\$3,898), and included more children with mothers with more than a high school education (20% compared to 10%).

Our sample only included children with no depressive symptoms at baseline (wave 1), excluding children with depressive symptoms (n=155). The excluded children who had depressive symptoms at wave 1 were compared to the children with no depressive symptoms at wave 1. It was found that excluded children who had depressive symptoms at wave 1 were: more likely to be female (58% compared to 48%), more likely to have mothers with more than high school education (37% compared to 20%), more likely to live in Puerto Rico (20% compared to 15%), and more likely to live in a single parent home (52% compared to 46%).

Additionally, children who started at wave 1 but dropped out by wave 3 were compared to children who completed the three waves of information using the Wilcoxon Mann Whitney test(a non-parametric analog to the independent samples t-test when the dependent variable is not assumed to be normally distributed). It was found that they were similar in the number of life events ( $p=0.975$ ), number of negative life events ( $p=0.810$ ), mean age ( $p=0.733$ ), per capita household income ( $p=0.145$ ), youth social support ( $p=0.245$ ), youth ways of coping (0.922), and parent coping ( $p=0.7602$ ). However, they were more likely to live in a two parent/other guardian household ( $p<0.0001$ ), or with mothers who had attained a higher educational level ( $p<0.0001$ ), and/or mothers who had been diagnosed with depression ( $p<0.0001$ ) compared to children who were included in the study.

### Sample Weights

The two samples in the Boricua Youth Study were representative samples of 5-13 year old children with at least one parent identifying themselves as Puerto Rican residing in 2,000 households in the San Juan Metropolitan Area, and in 2,000 households in the South Bronx. The samples were weighted to correct for differences in the probability of selection and the 2000 Census in the age/gender distribution. All statistical analyses were weighted to represent the age and gender distribution for the South Bronx and the standard Metropolitan Areas of Puerto Rico according to the 2000 US Census data (139).

### Final Model Testing

The model used needed to be able to handle longitudinal data, weights, complex sampling design and a Poisson distribution. Three statistical software packages were assessed for their strengths and limitations regarding these capabilities:

<b>Software</b>	<b>Longitudinal</b>	<b>Poisson</b>	<b>Weights</b>	<b>Complex sampling</b>
<b>SAS</b>	Yes	Yes	Yes	No
<b>STATA</b>	No	Yes	Yes	Yes
<b>SUDAAN</b>	Yes	No	Yes	Yes

SUDAAN™ was selected for the analyses because it is a powerful tool for analyzing repeated measures and cluster-correlated data like in the Boricua Youth Study.

Further analyses were conducted to check for the usefulness of using sample clusters and sample weights in the study. First, the calculation of the number of PSUs minus the number of strata yielded a number that was greater than 20 which according to Korn et al. (1988) roughly corresponds to an inefficiency of 13% so clustering was used in the analyses. Second, we calculated the degree of inefficiency (weighted compared to unweighted analyses) using the following formula:  $1 - (SE_{unwt}/SE_{wt})^2$  (weighted and unweighted SEs of the mean difference). The inefficiency was less than 10% so sample weights were used in the analysis (1988).

The model in manuscripts 1 and 2 was formulated with the following equations:

$$\log[E(Y_{ij}|b_i)] = DS_{ij} = \beta_0 + \beta_1 x_{ij-1} + b_i$$

( $x_{ij-1}$  = life events, types of life events)

( $I_{ij}$  = indicator to identify individuals with 2 or 3 waves of information)

The model in manuscript 3 was formulated with the following equation:

$$\log[E(Y_{ij}|b_i)] = DS_{ij} = \beta_0 + \beta_1 x_{1ij-1} + \beta_2 x_{2ij-1} + \beta_3 x_{3ij-1} + \beta_4 x_{4ij-1} + \beta_5 x_{5ij-1} + b_i$$

( $x_{1-5ij-1}$  = 5 levels of maltreatment)

( $I_{ij}$  = indicator to identify individuals with 2 or 3 waves of information)

Effect modification was tested by adding interaction term and main effects. Only statistically significant interaction terms were added in the final model:

$$\log[E(Y_{ij}|b_i)] = DS_{ij} = \beta_0 + \beta_1 x_{ij-1} + \beta_2 x_{ij-1} * z_{ij-1} + b_i$$

( $x_{ij-1}$  = life events)



( $t_{ij}$  = indicator to identify individuals with 2 or 3 waves of information)

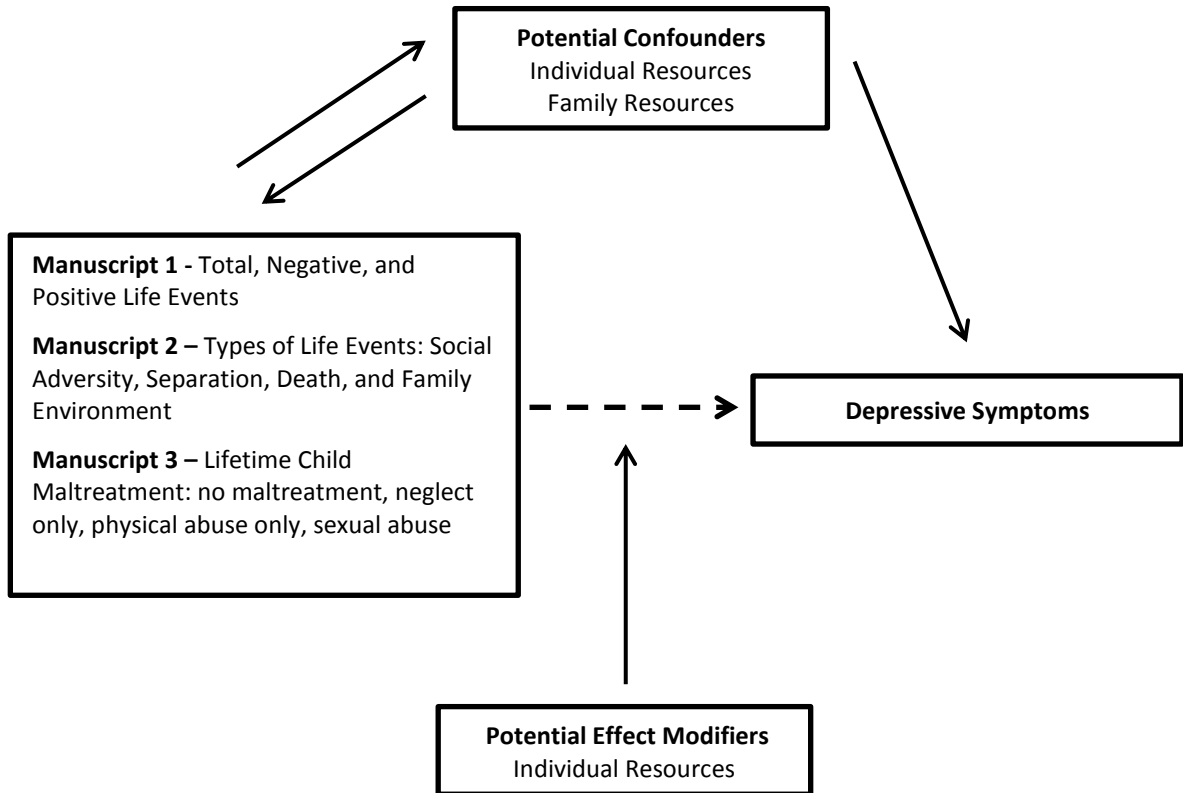
( $z_{ij}$  = effect modifier)

In manuscripts 1 and 2, the analytic sample was divided into two groups. Each group included: 1) Group 1: life events, negative life events, and positive life events at wave 1 and depressive symptoms at wave 2, and 2) Group 2: life events, negative life events, and positive life events at wave 2 and depressive symptoms at wave 3. Unadjusted regressions were conducted with the two groups to confirm that the direction and magnitude of the effects were similar and did not violate assumptions for a linear model (Model 1:  $b=0.21$ ,  $p<0.0001$ ; Model 2:  $b=0.22$ ,  $p<0.0001$ ) and then the two groups were combined to be examined as one model. Each respondent had therefore two counts of measures for the two time points (wave 1 covariates and wave 2 depressive symptoms; and wave 2 covariates and wave 3 depressive symptoms). A time variable distinguished the counts from the same individual.

In manuscript 3, the analytic sample used information from wave 1 for the main exposure and covariates and wave 3 for depressive symptoms. The covariates used in the final model were reported at wave 1. We analyzed three models to examine the association between child maltreatment and depressive symptoms. Model 1 was unadjusted, Model 2 was an adjusted model including significant covariates, and Model 3 was an adjusted model including significant covariates and the interaction term between maltreatment and youth support from parents.

## Model

**Figure 2.10. Model of the Hypothetical Relations between Confounders, Effect Modifiers, Life Events, and Depressive Symptoms**



## Human Subjects

The Boricua Youth Study was originally approved by the Institutional Review Board of the University of Puerto Rico (UPR) and UPR was the IRB on record. Approval from the Institutional Review Boards of UPR and University of Maryland College Park were obtained (Project Number 383803-1) for this dissertation. The current study used de-identified data and no additional data were collected. All applicable institutional regulations concerning the ethical use of human subjects were followed during the

research project. Information for the Boricua Youth Study was collected and processed under strict confidentiality to protect participant privacy and has been only used for research.

### **Chapter 3 - Association of life events and depressive symptoms among Puerto Rican Youth**

This manuscript follows the authors' instructions for the Journal of Abnormal Psychology at <http://www.apa.org/pubs/journals/abn/index.aspx>

## *Abstract*

Little has been published regarding socio-demographic determinants of depression and possible mechanisms for the development of depressive symptoms from childhood to adolescence in Latino populations. This study aims to examine the extent to which life events, place of residence, parental support, youth self-esteem and youth coping are related to the development of depressive symptoms among Puerto Rican youth.

Secondary analyses were performed of data from the longitudinal Boricua Youth Study (three annual waves between 2000-2004). The sample consists of 10 to 13 year old Puerto Rican youth residing in New York and Puerto Rico with no depressive symptoms at baseline (n=977). Our results indicate that: 1) depressive symptoms increase across waves with an increase in the numbers of 'total', 'negative', and 'positive or no effect' life events; 2) no multiplicative interaction was found for place of residence, youth support from parents, youth self-esteem and youth coping; 3) youth with low coping consistently had a higher number of depressive symptoms than youth with high coping regardless of number of 'total', 'negative' or 'positive or no effect' life events. This study identifies 'total', 'negative', and 'positive or no effect' life events as risk factors that may be considered in early interventions before depression develops.

## *Introduction*

Although Latino adolescents have been found to represent a growing high risk group for poor mental health outcomes (52), little has been published regarding social determinants of depression among Latinos (189). Specifically, little is known of the possible mechanisms for the development of depressive symptoms from childhood to adolescence among Latino subgroups(1).

Results from the 2011 Youth Risk Behavior Surveillance System from Puerto Rico show that 30.6% Puerto Rican youth grades 9-12 had “felt sad or hopeless for 2 or more weeks in a row so they stopped doing some usual activities”, compared to 24.7% of black youth and 27.2% of white youth in the U.S. (61). Puerto Rican youth also suffer from chronic conditions and negative outcomes that place them at higher risk for depression (190). For example, Puerto Rican youth have high rates of Type 1 diabetes (62), asthma (63), obesity (64), and teenage childbearing (65) compared to other Latino groups and the general U.S. population.

Puerto Ricans living in New York are one of the most disadvantaged groups with lower rates of school enrollment, educational attainment, and employment compared to all other groups (60). Puerto Ricans living in the island are not better off. A 2000 Population Reference Bureau report revealed that although the conditions for children improved between 1990 and 2000 in Puerto Rico, 58% of children still lived in families with incomes below the poverty line compared to 16% of children in the U.S., and one out of

seven adolescents ages 16 to 19 did not receive a high school diploma compared to one in ten in the general U.S. population (191). In addition, Puerto Ricans in the U.S. live under conditions that threaten the stability of the family and are directly associated with increased risk for mental health disorders among children and adolescents (59). For example, Puerto Ricans in the U.S. have higher rates of unemployment, divorce, and female householders with no spouse present compared to the general U.S. population (56-58).

Major depression is recognized as a serious psychiatric illness among adolescents, disrupting their maturation process and interfering with critical life choices and long term adaptation (101). Nationally representative surveys indicate that the prevalence of major depression and dysthymia increases between early adolescence and adolescence (11, 134), almost doubling between ages 13-14 (8.3%) and 17-18 (15.4%). However, approximately 50-67% of depressed adolescents will not be identified as being depressed by their health care provider and will therefore not receive any type of care for their depression (9, 29, 42, 192). The failure to identify depressed adolescents is amplified by the lack of understanding by the parent/caregiver of their child's psychiatric symptoms and by the parent/caregiver's uncertainty of when to seek help (146). Adolescents may present with comorbid mental health disorders (e.g. 30-80% anxiety, 10-80% disruptive, and 20-30% substance abuse) that make the diagnosis of depression uncertain (193). The major issue is that adolescents may present with depressive symptoms that do not meet the full criteria for depression as specified in the *Diagnostic and Statistical Manual of Mental Disorders* (194). However, youth with sub-clinical depression have been shown to

be significantly impaired, use more mental health services than youth who had clinical depression (95), and be more likely to develop adult depression (32, 136).

Adolescence is a critical developmental period (97) characterized by rapid increases in the experience of life events (98-100). Children's awareness of life events starts to emerge late in childhood as children experience more autonomy (195), and face big physical, social and cognitive changes (196). Research shows a robust and causal association between life events, stress and depression both in community and clinical populations (72, 98, 101, 164, 165, 197-200). The experiences of positive or negative life events lead individuals to make psychological adjustments (201). The cumulative effect of psychological adjustments can trigger adaptive responses that cause stress and eventually lead to disease (201). The presence of depressive symptoms can serve as an indicator of maladaptive responses to internal and external events (99). Other research has focused on undesirable (202), uncontrollable (75), or life-threatening (71) life events to show that the accumulation of negatively appraised events is more stressful than the accumulation of both positive and negative events. Individuals who experience stressful life events compared to individuals who experience non-stressful life events are more likely to develop depression and other mental disorders (99, 203).

This study focuses on life events that take place at a critical developmental period.

According to the life course approach (130, 131), events that occur during childhood and adolescence could have an impact on future health through both differential early exposures and developmental trajectories across the life-span. In addition we seek to test



Hill's theory of family stress (135, 156) which states that there is a set of major stressors that lead families to physical, emotional or relational crises, and a set of key protective factors such as family environment, and family and individual resources that lead to a successful adaptation to stress (103). Protective factors that modify the psychological consequences of stressors and stressful events on depression may include individual coping and social support from family members and other adults (e.g. advice, access to resources) (25, 110, 111, 114-116).

This longitudinal study aims to examine a sample of 10-13 year old Puerto Rican youth living in New York and Puerto Rico from the Boricua Youth Study to determine the extent to which life events - whether negative, positive, or in combination - are associated with the development of depressive symptoms. We hypothesize that an increase in the experience of negative life events is associated with a greater number of depressive symptoms compared to an increase of either total or positive life events. We also want to test whether ways of coping, self-esteem, youth support from parents, and place of residence have a potential moderating role in the association between life events and depressive symptoms.

### *Methods*

The Boricua Youth Study is a longitudinal study of psychiatric disorders among 5-13 year old Puerto Rican children and adolescents living in the South Bronx, New York and the San Juan and Caguas Standard Metropolitan Areas in Puerto Rico. Data from multistage probability samples that represent the target areas according to the 1990 U.S.

Census were collected at both sites over three annual waves (2000-2004). Up to three children per household were eligible if the household met the following criteria - the presence of a 5-13 year old child, and both the child and at least one of the primary caregivers had to be of Puerto Rican origin. Structured in-person interviews were conducted in English or Spanish by trained lay interviewers with parents and children at their homes. Further details on design and procedures for the Boricua Youth Study are described by Bird et al. (2006).

This study included children 10-13 years of age at baseline who met the following criteria: 1) no depressive symptoms at wave 1 (2000-2001); 2) participated at least in wave 1 (2000-2001) and either wave 2 (2001-2002) and/or wave 3 (2002-2004); 3) had complete life events data for both waves 1 and 2; and 4) had complete data on depressive symptoms at waves 2 and 3. Youth were excluded if they had depressive symptoms at wave 1 (n=155) or were missing life events information at wave 1 or wave 2 (n=5) resulting in an analytic sample of 977 youth. We limited the analytic sample to youth 10 years old and older who answered the youth version of the National Institute of Mental Health Diagnostic Interview Schedule for Children, Version IV (DISC-IV) (142) because reliability for this instrument in younger populations is poor (139). We excluded children with depressive symptoms at wave 1 to establish a temporal relationship between life events and the onset of symptoms after the event.

*Outcome Variable* – In this study we use the count of 0 to 9 depressive symptoms in the past 12 months reported at waves 2 (2001-2002) and 3 (20002-2004) using the

Diagnostic Interview Schedule for Children, version IV (142). The DISC-IV is an acceptable and widely used instrument to ascertain a wide range of child and adolescent psychiatric diagnoses. Despite the large number of diagnostic instruments, the DISC-IV is one of only two instruments that have psychometric data available for U.S. Latinos (151). The instrument was translated and adapted into Spanish, and two studies were conducted in Puerto Rico to assess test-retest reliability (143). Overall parent reliability was found to be moderate ( $\kappa=0.57$ ) for major depression (5 or more depressive symptoms) compared to the reliability of children 11-17 years of age ( $\kappa=0.15$ ) (143). Similar results were reported for the English DISC IV. In this study we chose to focus on the nine items that are significant predictors of depression (149). We chose to focus on a count of depressive symptoms since depression is known to have its onset in adolescence, and our population was too young to include a significant number of youth with diagnosable depression. Lucas et al. (2001) report that the scale has good reliability (Cronbach's  $\alpha = 0.82$ ). For the purpose of this study, depressive symptoms were the combined measure of positive counts of symptoms for major depression in the last 12 months reported by either the child or the primary parent/caregiver (142) to capture the most complete information on depressive symptoms.

*Exposure Variable* – Life events in the preceding 12 months were based on child reports at waves 1 and 2. Three measures were developed for analysis: count of ‘total’ life events whether identified as ‘positive or no effect’ (“mostly good” or “affected them not at all or only a little”) or ‘negative’ (“mostly bad”) by the respondent (count of 20 out of 21 positive and negative life events, excluding the item ‘other’ life events), number of

‘negative’ life events (count of life events identified as “mostly bad” by the respondent), and ‘positive or no effect’ life events (count of life events identified as “mostly good” or “affected them not at all or only a little” by the respondent). The list of life events in this study is derived from the original 46 items included in the Life Events Checklist and asks respondents to indicate if each event was positive or negative (157). Brand and Johnson (1982) found that the test-retest reliability for the Life Events Checklist was found to be substantial for both ‘positive or no effect’ ( $\kappa=0.69$ ) and ‘negative’ events ( $\kappa=0.72$ ). The advantages of using checklists in community surveys are that they are brief and easy to administer. However, checklists have several limitations related to their retrospective nature (e.g. recall bias, recall dropping over time), and how participants interpret events (e.g. questions about events are imprecise, personal disposition influences the recall of events), (159, 160).

*Potential Confounders and Effect Modifiers* - Potential confounders were identified through the literature review, and their selection was based on Hill’s Family Stress Theory (170). Socio-demographic and family resource variables included: age (in years), gender (reported by the interviewer), place of residence (San Juan, Puerto Rico; and South Bronx, New York), family composition (single or two biological/other parent household), per capita household income (calculated by dividing household income by the number of household dwellers not adjusted for the U.S. and Puerto Rico), and parental education (less than high school, high school, and more than high school).

Parent/caregiver **received** social support was a sum derived from answers to three items of the Parent Social Support scale in the adult questionnaire. Three items with the best internal consistency scores in the acceptable range (Cronbach's  $\alpha = .70$ , at wave 1) were selected by performing multiple correlation analyses (174). The three items are similar to those found in other received social support scales in the literature (128, 175, 176). Items relate to how often a parent gets together with family members who do not live at home, how often parents attend family gatherings and how often family members take care of the respondent's children. Response categories include 4 levels ranging from 0 = *never/once a year or less*, to 3 = *at least once a week* for all items.

Parent/caregiver **perceived** social support was measured by one item of the Parent Social Support scale of the adult questionnaire: "In general how satisfied are you with the amount of support that you receive in your life?" Response categories ranged from 0 = *very satisfied*, to 3 = *very unsatisfied* for all items.

Potential effect modifiers included place of residence (either living in San Juan, Puerto Rico, or the Bronx, New York), youth support from parents, youth self-esteem, and youth coping. Place of residence was based on the interviewer's report in the Profile section of the child questionnaire. Place of residence was selected because it has been found to influence patterns of internalizing disorders (178). Ramos et al. found that youth in New York had higher levels of internalizing symptoms, including depressive symptoms compared to youth living in Puerto Rico. In the study, the differences were accounted for by differences in the experience of discrimination and exposure to violence between the

two contexts. Youth Support from Parents was a count derived from the Parent/Child Relationship scale of the child questionnaire and was measured at waves 1 and 2. The Parent/Child Relationship scale consisted of 12 items (e.g. “How often do your parents/caretakers help you make important decisions?”) and had good reliability when calculated for this study (Cronbach’s  $\alpha = .74$ , at wave 1). Responses consisted of 2 categories, where 0 = *rarely or never* and 1 = *sometimes or often* for all items. Based on the sample distribution, Youth support from parents was categorized into three levels (low= <9 items, moderate= 9-11 items, high= >11 items). Youth ways of coping was only measured at wave 1 (trait coping) and dichotomized (low= <3 items, and high=  $\geq 3$  items) based on the weighted sample mean (3.28 items) and was assessed through the Ways of Coping scale of the child questionnaire (179). The variable consisted of the count of 5 items such as “When you have a problem... you do what you have to do to solve it?” Responses in the child questionnaire consisted of two categories, where 0 = *rarely or never* and 2 = *sometimes or often* (the latter category was recoded as 1 for the purpose of the analyses). We calculated Cronbach’s alphas for several combinations of the Ways of Coping items but dropping items did not improve the coefficients and a decision was made to use the full scale. The full scale had low reliability (Cronbach’s  $\alpha = .45$ , at wave 1) possibly because the scale was not developed for Latino populations and may not be as reliable for that population (28). However, we retained this scale because it has a theoretical base, and results can be compared with other Boricua Youth Study research (180). Youth self-esteem was assessed through the Self Esteem scale of the child questionnaire (204). Youth self-esteem was based on a count of eight items provided by the self-perception profile which included five domains: school and athletic competence,

social acceptance, behavior, and physical appearance. The scores for the Self Esteem scale ranged from 0 to 8, with 8 representing the highest score of self-esteem. Responses to the items in the scale consisted of two categories where 0 = *no* and 2 = *yes* (the latter category was recoded as 1 for the purpose of the analyses). The reliability of the Self Esteem scale was calculated by Bird et al. (139) and found to be 0.46. Despite the low reliability, the scale was kept because it has a theoretical base and results can be compared with other Boricua Youth Study research.

### *Data Analysis*

Descriptive statistics were calculated to check for missing values, outliers and errors and to provide a quantitative description of the study population in terms of family and individual socio-demographic variables, and resources variables. Chi-square tests and *t*-tests were performed to examine categorical and continuous variables by place of residence. Multiplicative effect modification was tested through the addition of an interaction term between the main effect and the potential effect modifier to the model. Although place of residence was not a significant effect modifier, it was used because in previous studies has been found to have a mental health impact (124). Potential confounders were identified by conducting a bivariate analysis to assess their association with 'total', 'negative', or 'positive or no effect' life events and depressive symptoms (conditional on exposure) at the  $\alpha=0.10$  level (184, 185). Once identified as potential confounders, the variables were further tested by adding them one at a time to the unadjusted model between depressive symptoms, and total life events or negative life events. A 5% change in the main effect estimates between the unadjusted and adjusted

models further confirmed the variable as a confounder and the variable was added to the final model. Multicollinearity between variables was assessed with tolerance scores using the standard cutoff of 0.1. All tolerance values were found to be in the acceptable range between 0.97 and 0.99. Missing data were not imputed because the missing observations constituted less than 10% of the analytic sample and were dropped from the analytic sample.

Two separate models were assessed between ‘total’, ‘negative’, and ‘positive or no effect’ life events at wave 1 and depressive symptoms at wave 2; and between ‘total’, ‘negative’, and ‘positive or no effect’ life events at wave 2 and depressive symptoms at wave 3. The two models were tested through regressions and when found to be similar (Model 1:  $b=0.21$ ,  $p<0.0001$ ; Model 2:  $b=0.22$ ,  $p<0.0001$ ) they were combined into one model. Log-linear Poisson regression models were used to examine the association between the number of ‘total’, ‘negative’ or ‘positive or no effect’ life events in the previous 12 months at waves 1 or 2, and reports of depressive symptoms at subsequent waves (waves 2 or 3 respectively) among those with no depressive symptoms in the previous 12 months at wave 1. If life events were measured at wave 1, then the socio-demographic and individual resource variables used in the analyses were also measured at wave 1. If life events were measured at wave 2, then the covariates used in the analyses were also measured at wave 2 with the exception of coping which was only measured at wave 1.



SAS® software Version 9.3 (SAS Institute Inc., Cary, NC, USA) was used to perform variable selection. SUDAAN™ software (release 11, 2011) (183) was used to adjust standard errors for correlations resulting from the complex multistage sampling (observations nested within individuals, siblings nested within households, and households nested within census blocks). Weights were used in all analyses to adjust for the difference in probability of selection and to represent the age and gender distribution of the 2000 census. All p-values were considered significant at the  $< 0.05$  level.

### *Results*

Socio-demographic characteristics of children without depressive symptoms at wave 1 by place of residence indicate that youth support from parents, youth self-esteem, and youth coping were significantly higher in the Bronx than in Puerto Rico. Puerto Rico youth had a greater number of youth living in two parent households, a higher per capita household income, and had mothers with a higher level of education and depression than youth living in the Bronx (Table 3.1). Results for mean depressive symptoms are not shown in Table 3.1 as the analytic sample in wave 1 only includes youth with no depressive symptoms. However, mean depressive symptoms for the sample which includes mostly youth with no depressive symptoms was 0.20 at wave 2 and 0.22 at wave 3. The weighted sample mean of ‘positive or no effect’ life events (1.33) was higher than mean ‘negative’ life events (0.93).

Although not shown here, 69% of youth reported at least one ‘positive or no effect’ event, 41.4% of youth reported at least one ‘negative’ event, and 80.4% of youth reported

any event. Thirty-eight percent of youth reported at least one ‘positive or no effect’ event and no ‘negative’ events, while only 9% reported at least one ‘negative’ event and no ‘positive or no effect’ events. Close to 25% of youth reported at least one ‘positive or no effect’ and at least one ‘negative’ event. The same life events could be interpreted as negative or positive. The top five ‘negative’ events were: lost a close friend/a close friend moved away, someone in the family got arrested, someone in the family went to jail, someone in the family you loved died, and your pet died. The top five ‘positive or no effect’ events (children answered that the event was “mostly good” or had “affected them not at all or only a little”) were: you started a new school, lost a close friend/a close friend moved away, you broke up with a boy/girlfriend, someone in the family you loved died, and your pet died. The top 5 combinations of ‘negative’ and ‘positive or no effect’ events were: 1) someone in the family you loved died (negative) and lost a close friend/a close friend moved away (positive or no effect); 2) someone in the family you loved died (negative) and your pet died (positive or no effect); 3) your pet died (negative) and lost a close friend/a close friend moved away (positive or no effect); 4) your pet died (negative) and you started a new school (positive or no effect); and 5) lost a close friend/a close friend moved away (negative) and your pet died (positive or no effect).

Socio-demographic and family characteristics for children included in this study were compared to those children who were excluded because they had depressive symptoms at wave 1 (n=155). Excluded children were compared to included children using chi-square and *t*-tests. Excluded children were more likely to live in a two parent/other guardian household ( $p<0.0001$ ), or with mothers who had attained a higher educational level

( $p<0.0001$ ), and/or mothers who had been diagnosed with depression ( $p<0.0001$ ) compared to children who were included in the study. Merikangas et al. found some similar socio-demographic characteristics: rates of mood disorders were higher for children living with currently married or cohabitating parents (11). In addition, studies show that the risk for youth depression is the result of a combination of multiple family factors, including depression (205).

The percent of youth with depressive symptoms increased from 0% at wave 1 (no depressive symptoms at wave 1) to 7.0% in wave 2 and 6.6% in wave 3 (not shown). Of the 107 youth who reported depressive symptoms in waves 2 and/or 3, 19 (17.7%) reported depressive symptoms at both waves 2 and 3 (persistent symptoms), 46 (43.0%) reported depressive symptoms only at wave 2, and 42 (39.3%) reported depressive symptoms only at wave 3 (intermittent symptoms). The mean number of total life events or negative life events show a significant decrease between both waves 1 and 2 ( $p<0.0001$ ), and waves 2 and 3 ( $p<0.0001$ ).

Although youth coping, parent coping, and youth support from parents were initially identified as confounders, they lost significance when tested for their effect on the association between life events and depressive symptoms, and were therefore removed from the final models. Place of residence, youth support from parents, youth self-esteem and youth coping were tested as effect modifiers but had no multiplicative interaction effects on the association between life events and depressive symptoms. Table 3.2 shows that a unit increase in 'total' life events [ $b(SE)=0.20(0.05)$ ,  $p<0.0001$ ] resulted in a 22.1%

increase in depressive symptoms, a unit increase in ‘negative’ life events [ $b(SE)=0.22(0.07)$ ,  $p<0.0001$ ] resulted in a 24.6% increase in depressive symptoms, and a unit increase in ‘positive or no effect’ life events [ $b(SE)=0.26(0.09)$ ,  $p<0.0001$ ] resulted in a 29.7% increase in depressive symptoms. Percentage increases were calculated by exponentiating the beta coefficient for total, ‘negative’ or ‘positive or no effect’ life events.

Although youth coping was not a significant effect modifier in the multiplicative scale, we included figures to show that additive interaction between life events and youth coping may be present, although youth coping does not show a multiplicative interaction effect. Figures 3.1a and 3.1b show a comparison of mean depressive symptoms and ‘total’, ‘negative’, and ‘positive or no effect’ life events by level of youth coping for youth 10-13 years old with no depressive symptoms at wave 1. In Figure 3.1a (events at wave 1, depressive symptoms at wave 2), youth with low coping had consistently higher numbers of depressive symptoms than youth with high coping regardless of the number of ‘total’ life events, ‘negative’ life events, or ‘positive or no effect’ life events. In Figure 3.1b (events at wave 2, depressive symptoms at wave 3), there is no such pattern between life events and youth coping.

### *Discussion*

Our results show that depressive symptoms increase with the number of total and negative life events which support other findings in the literature (98, 199, 206-209). The increase in depressive symptoms between childhood and adolescence (37) is concurrent

to an increase in exposure to new experiences (196). As youth grow older they will undergo significant physical, social, and cognitive changes, gain autonomy, and shift their orientation from their parents to outside the family children (195, 210). The effect of negative life events on depressive symptoms was higher than the effect of number of total life events. This result is similar to previous research that found negative life events are more likely to result in depressive symptoms than any other life event (72, 188). However, we did not observe the strong association between negative life events and depressive symptoms described in previous studies in both adult and adolescent populations (211, 212).

Our data suggest that ‘positive or no effect’ life events (as appraised by children when asked if the event was ‘mostly good’ or had ‘affected them not at all or only a little’) result in an increase in depressive symptoms. Most studies report that positive events mitigate the effects of life stresses (164, 213). Our conflicting results may be explained by the percentage of youth in our sample who had reported at least one ‘positive or no effect’ life event including the deaths of a family member and/or a pet. In the literature, loss events have been consistently reported as risk factors for depression (98, 214). We also found that the youth who reported only ‘positive or no effect’ events had a lower self-esteem than youth who reported negative and total life events. Fresco et al. (2006) show that an external, unstable and specific attributional style for positive events was related to a high level of depression (215).

Although the increases in depressive symptoms are modest, over time they get compounded and may contribute to later depression. Our findings confirm research that conceptualizes depressive disorders as a continuum that does not depend on meeting a specific diagnostic threshold (48). Although the standardization of diagnostic criteria allows for the classification of distinct subtypes of depression dividing youth into cases and non-cases of depression misses the number of individuals who do not meet the criteria for depression but have relevant depressive symptoms (216). Adolescents showing sub-clinical depressive symptoms (e.g. youth with depressive symptoms who do not meet the criteria for a depressive disorder) show higher rates of early adult depression (32,136) as well as a similar risk profile to those who meet the criteria for a depressive disorder (95). Depressive symptoms have been shown to be risk factors for various depressive disorders other than major depression. An example is the study conducted by Gonzalez-Tejera et al. (2005) which shows that a large proportion of youth with symptoms of depression may not meet the criteria for major depression but instead meet the criteria for minor depression (at least two symptoms but less than five).

Contrary to previous findings, youth support from parents, youth coping, youth self-esteem, and place of residence did not show multiplicative interaction in the association between life events and depressive symptoms (109, 217, 218). However, we observed that mean depressive symptoms for youth with low coping and at least three total or negative life events was at least 10 times higher than the mean depressive symptoms for youth with high coping and no life events. Studies have shown an association between stressful life events and depression. Coping influences the response to stressors (109),

and the way an individual copes with a situation will determine the way the individual is affected by stress (25, 110, 111).

The strengths of this study include three waves of depressive symptom assessments using a widely used psychometrically reliable and valid measure (DISC-IV). To our knowledge, this is the only study on the longitudinal association between life events and depressive symptoms among Puerto Rican youth. Lastly, the statistical software SUDAAN is ideal for the analysis of correlated data encountered in complex survey design.

Several limitations are identified for consideration: First, ‘number of depressive symptoms is not a diagnosis of depression. Second, causality between life events and depressive symptoms cannot be established with certainty because each can modify the reporting of the other (219). Third, adolescents with depression may be biased toward recalling or reporting more life events and as a result may artificially inflate the association (166). Fourth, children excluded from the study were found to have higher mean depressive symptoms and higher mean life events. Finally, SUDAAN is not recommended for Poisson distributions with an overdispersion of negative answers as it results in larger standard errors and lower statistical power. Our results may therefore be overly conservative.

Future studies with this data set should assess the longitudinal association of life events and depressive symptoms among youth who experience intermittent symptoms and youth

who experience persistent symptoms. Depressive symptoms should also be examined empirically as a categorical variable based on the number of depressive symptoms a standard deviation above or below the median and mean number of symptoms. Another study could follow-up youth to examine the risk factors of those who develop depressive disorders in young adulthood. Further research into ‘no effect’ and ‘positive only’ life events should be conducted to better understand their effects on depressive symptoms. Lastly, future studies should consider specific types of negative life events such as exposure to violence and victimization which have been found to be associated with internalizing disorders (124), and child maltreatment.

Given that the number of depressive symptoms in adolescence has been found to predict depression later in life, it is important to identify early predictors in order to develop interventions that may mitigate the impact of depression before it becomes a chronic disorder. This study identifies ‘total’, ‘negative’, and ‘positive or no effect’ life events as risk factors that may be considered in early interventions before depression develops. Particular attention should be given to youth who report ‘positive or no effect’ events. In addition, youth with low coping appear to be at particularly high risk of developing depressive symptoms following life events.



Tables

Table 3.1. Socio-Demographic Characteristics, and Individual and Family Resources at Wave 1 for 10-13 Year Old Youth without Depressive Symptoms by Geographic Area (weighted)

	<b>Total</b> <b>(n=1,068)</b>	<b>Bronx</b> <b>(n=509)</b>	<b>Puerto Rico</b> <b>(n=559)</b>	<b>p-values</b>
<b>Number of Total Life Events (Mean, SE)</b>	2.26 (0.06)	2.30 (0.09)	2.10 (0.08)	<b>0.0430<sup>a</sup></b>
<b>Number of Negative Live Events (Mean, SE)</b>	0.93 (0.04)	0.95 (0.06)	0.86 (0.05)	0.2693 <sup>a</sup>
<b>Number of Positive or No Effects Life Events (Mean, SE)</b>	1.33 (0.04)	1.36 (0.06)	1.20 (0.06)	<b>0.0491<sup>a</sup></b>
<b>Male (%)</b>	51.53	51.6	51.52	0.5873 <sup>b</sup>
<b>Age in Years (Mean)</b>	11.44 (0.03)	11.44 (0.05)	11.46 (0.05)	0.1037 <sup>a</sup>
<b>Age Distribution (%)</b>				<b>&lt;0.0001<sup>b</sup></b>
10	27.82	28.11	26.16	
11	24.74	24.61	25.49	
12	22.67	22.39	24.22	
13	24.77	25.88	24.14	
<b>Household Per Capita Income (Mean, SE)</b>	3906 (129.2)	3810 (181.5))	4432 (209.6)	<b>0.0250<sup>a</sup></b>
<b>Mother's Education (%)</b>				<b>&lt;0.0001<sup>b</sup></b>
Less than High School	42.16	45.63	22.86	
High School Diploma/GED	43.33	43.47	42.53	
More than High School	14.51	10.9	34.61	
<b>Family Composition (Number of Parents Living in Household) (%)</b>				<b>&lt;0.0001<sup>b</sup></b>

Two Biological/Other Parent	54.86	51.99	70.98	
One Biological/Other Parent	45.14	48.01	29.02	
<b>Youth Support from Parents (Mean, SE)</b>	3.28 (0.07)	3.32 (0.09)	3.09 (0.10)	<b>0.0001<sup>a</sup></b>
Low ( $\leq 9$ )	15.2	14.1	21.1	<b>&lt;0.0001<sup>b</sup></b>
Medium (9-11)	42.6	42.1	45.3	
High ( $> 11$ )	42.6	43.8	33.6	
<b>Youth Coping</b>	3.28 (0.04)	3.32 (0.06)	3.09 (0.04)	<b>&lt;0.0001<sup>b</sup></b>
Low ( $< 3$ )	22.5	22.7	21.3	
High ( $\geq 3$ )	77.5	77.3	78.7	
<b>Youth Self Esteem (Mean, SE)</b>	6.2 (0.04)	6.3 (0.05)	5.9 (0.06)	<b>&lt;0.0001<sup>a</sup></b>
<b>Parental Received Social Support (Mean, SE)</b>	5.15 (0.08)	4.28 (0.12)	5.86 (0.10)	<b>&lt;0.0001<sup>a</sup></b>
<b>Parental Perceived Social Support (Mean, SE)</b>	2.53 (0.02)	2.39 (0.03)	2.61 (0.03)	<b>&lt;0.0001<sup>a</sup></b>
<b>Parental Coping (Mean, SE)</b>	11.83 (0.09)	11.84 (0.13)	11.77 (0.12)	0.6599 <sup>a</sup>
<b>Diagnosed Maternal Depression (%)</b>	3.32	2.98	5.2	<b>&lt;0.0001<sup>b</sup></b>

<sup>a</sup> *t*-test

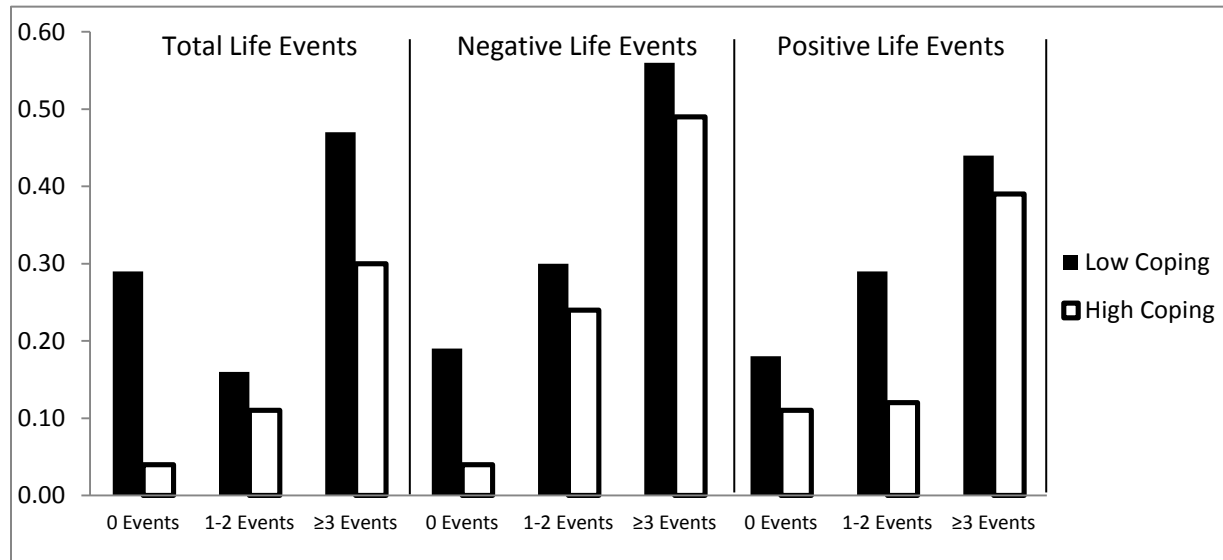
<sup>b</sup> Chi-square test

*Table 3.2. Log-Linear Poisson Regressions of Number of Total Life Events, Negative Life Events, or Positive or No Effects Life Events in the last 12 Months (at waves 1 or 2) on Depressive Symptoms (at waves 2 or 3 respectively)*

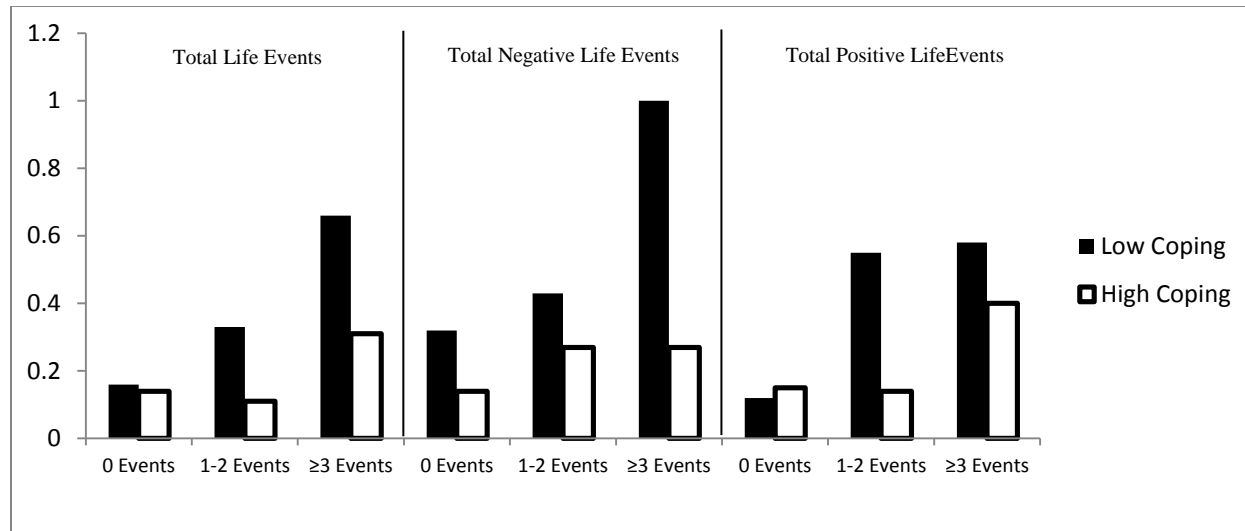
	Unadjusted Models			Final Models <sup>a</sup>		
	b	SE	P-value	b	SE	p-value
<b>Number of Total Life Events</b>				0.20	0.05	<b>0.0001</b>
Family Composition (ref=1 parents household)	0.32	0.24	0.2126			
Parents Social Support	0.10	0.05	0.0733			
Youth Support from Parents						
<9	ref.	ref.	ref.			
9-10	-0.42	0.33	0.1895			
≥11	-0.54	0.34	0.1153			
Youth Coping						
<3	ref.	ref.	ref.			
≥3	-0.38	0.13	0.1600			
<b>Number of Negative Life Events</b>				0.22	0.07	<b>0.0037</b>
Parents Received Social Support	0.11	0.05	0.0596			
Youth Support from Parents						
<9	ref.	ref.	ref.			
9-10	-0.45	0.33	0.1818			
≥11	-0.58	0.34	0.0951			
Youth Coping						
<3	ref.	ref.	ref.			
≥3	-0.38	0.27	0.1626			
<b>Number of Positive or No Effects Life Events</b>				0.26	0.09	<b>0.0005</b>
Parents Received Social Support	0.08	0.05	0.0949			
Youth Support from Parents						
<9	ref.	ref.	ref.			
9-10	-0.45	0.35	0.1824			
≥11	-0.38	0.35	0.1073			
Youth Coping						
<3	ref.	ref.	ref.			
≥3	-0.38	0.26	0.1440			

<sup>a</sup> Neither confounders nor interaction terms were significant and were therefore not added to the final model

*Figure 3.1a. Mean Depressive Symptoms (wave 2) and Number of Total, Negative, and Positive or No Effects Life Events by Level of Youth Coping at (wave 1) for Youth 10-13 Years with No Depressive Symptoms at Wave 1*



*Figure 3.1b. Mean Depressive Symptoms (wave 3) and Number of Total, Negative, and Positive or No Effects Life Events by Level of Youth Coping at (wave 2) for Youth 10-13 Years with No Depressive Symptoms at Wave 1*



## **Chapter 4 – Association of Separation, Death, and Social Adversity with Depressive Symptoms among Puerto Rican Youth**

This manuscript follows the authors' instructions for the Journal of Clinical Child and Adolescent Psychology at <http://www.tandfonline.com/toc/hcap20/current#.Uw-rgONdWVN>

## *Abstract*

**Objective:** This study aimed to examine the association between four types of life events (family environment, separation, social adversity, and death) and the development of depressive symptoms among Puerto Rican youth, and the potential modifying role of place of residence, youth support from parents, and youth coping.

**Method:** A secondary analysis was performed using three waves (2000-2004) of the Boricua Youth Study interview data for 10-13 year old Puerto Rican youth residing in New York and Puerto Rico with no depressive symptoms at baseline (n=977).

**Results:** Key findings were: 1) depressive symptoms increase across waves with an increase in social adversity, separation, and death events; 2) this pattern is seen regardless of place of residence, youth support from parents, youth self-esteem, and youth coping for social adversity and separation events; 3) youth support from parents confounded the association between death events and depressive symptoms; 4) youth experiencing any type of event had higher mean depressive symptoms than youth not experiencing any type of event.

**Conclusions:** Death, family environment, and social adversity life events are potentially relevant to use in conjunction with other screening tools to identify youth at risk of developing depressive symptoms.



## *Introduction*

Depression is a rare psychiatric disorder in childhood but becomes one of the most common disorders in adolescence (8). There are few studies on adolescent depression, and the mechanisms by which only some adolescents develop depression while others do not are not well understood (134). Despite the growth of the Latino population by 43% between 2000 and 2010 (50), Latino youth remain relatively under-represented in mental health research (55), and little is known about the determinants of Latino youth depression by Latino subgroup (220). Puerto Ricans living in the U.S. are the second largest group of Latinos (4.6 million), representing 9% of the Latino population (50). Of all the Latino subgroups, adult Puerto Ricans are more likely to face social disruption (e.g. high alcohol consumption, divorce rates, criminality, and school dropout rates) and a lower socioeconomic status (38). These social characteristics have been shown to threaten family stability and place youth at an increased risk for developing depression (59).

Research shows that early onset depression in adolescence has severe social and health consequences later in life (30). Early onset depression may result in severe chronic depression and poorer psychosocial outcomes in young adulthood (221), and in high recurrence rates in adulthood (40-60% recurrence), (222). In addition, as adolescents grow and gain more autonomy, they are increasingly exposed to potentially disruptive events which may also lead to increases in rates of depression (97-100, 210).

Several checklists were developed to assess life events (e.g. Life Events Checklist, Life Experience Survey, Stressful Life Events Schedule) (157, 223, 224) however, the number and nature of events included in the checklists varied depending on the focus of the research that was being conducted. Critics argued that not all life events had the same weight and that some events were more stressful or had more impact in some populations (225). Continuing interest in the etiology of mental illness led researchers to focus on the impact of certain types of life events (209). Aggregating life events allowed researchers to further study the association between life events and specific mental disorders. (102, 194, 212, 226, 227).

Approaches to grouping life events have included identifying events that are stressful (228); severe or threatening (229); desirable or undesirable (230); acute or chronic (231); or used multiple categories (e.g. loss, death, autonomy, deviance, accident/illness, health, relocation events) (212, 232). Despite the lack of agreement about the nature and definition of categories of life events (233), researchers found that some types of life events were associated with the development of specific mental disorders (197, 227, 234).

Stressful, severe or threatening life events have been significantly associated with depression in several studies (229). However, although most individuals will be exposed to traumatic events and losses in their lifetime, only some will develop depression while the majority will recover and move ahead (235). The mechanisms by which stressful events affect individuals are not fully understood (236). An explanation for differences in

response to stressful events is that resilient individuals have been found to overcome challenges by mobilizing personal and social resources to cope with stress and adversity (237).

The main objective of this study is to identify and compare types of life events that are significantly associated with depressive symptoms among 10-13 year old Puerto Rican youth. This study seeks to examine different types of life events that lead families to physical, psychological or interpersonal crises, as postulated in Hill's Theory of Family Stress (170). Our research questions aim to find if certain types of events result in greater number of depressive symptoms, and whether the resolution of crises were modified by place of residence, youth coping or social support (25, 110, 111, 116).

### *Methods*

This study uses data collected in three annual waves between summer 2000 and fall 2004 of the Boricua Youth Study (BYS). The BYS is a longitudinal study of child and parent/caregiver data on psychiatric disorders that uses multistage probability samples to represent 5-13 year old Puerto Rican children living in the South Bronx, New York and San Juan, Puerto Rico according to the 2000 U.S. census. Eligible households included at least one 5 to 13 year old child residing in the household at the time of the census, with at least a parent living in the household who was of Puerto Rican background. Up to three children were selected among households with multiple children. Trained lay interviewers conducted home interviews at the same time but separately with children

and parents/caregivers in Spanish or English based on language preference. The BYS includes data on family socio-demographic characteristics, child psychopathology and other risk factors for mental disorders. Parents provided signed informed consent, while children 7 or older provided signed informed assent. The attrition rate was 7.95% at wave 2, and 11.88% at wave 3. For a more detailed description of the study's background, design and methods refer to work conducted by Bird et al. (2006). Institutional Review Board approval for this project was obtained both from the University of Puerto Rico and the University of Maryland College Park.

The analytic sample included 977 Puerto Rican children 10-13 years old who met the following conditions: 1) no depressive symptoms at wave 1; 2) participated in both waves 1 and 2; 3) had complete life events data for both waves 1 and 2; and 4) had complete depressive symptoms data at waves 2 and 3. Excluded from the analytic sample were youth with depressive symptoms at wave 1 (n=155) or youth missing life events information at wave 1 or wave 2 (n=5). Children 5-9 years of age were excluded from the analysis because the reliability of the instrument measuring psychiatric disorders in this population is poor (139). We excluded children with depressive symptoms at wave 1 in order to establish a temporal sequence between life events at waves 1 and 2 and the development of depressive symptoms at waves 2 and 3.

*Outcome variable* – Depressive symptoms (reported at waves 2 and 3) was the count of symptoms experienced in the past 12 months. We chose to use the 9 questions that have been shown to accurately predict depression (149). Depressive symptoms are derived

from the National Institute of Mental Health Diagnostic Interview Schedule for Children, Version IV (DISC-IV) Major Depression Schedule (142) and has been recommended to be used as a standardized tool for quick evaluation of children and adolescent diagnoses. Lucas et al. (2001) calculated the reliability to be good (0.82). Although depression has its onset in adolescence, we chose to focus on the count of depressive symptoms because our population was too young to rely on diagnosable depression. Depressive symptoms were a combined measure of responses provided by children and their primary parents/caregivers using the DISC-IV(142). The English version of the DISC-IV is a commonly used instrument to ascertain a wide range of child and adolescent psychiatric diagnoses. DISC-IV is only one of four instruments that have been translated into Spanish and only one of two instruments with psychometric data available for U.S. Latinos (151). The moderate test-retest reliability of the Spanish version was found to be similar to the English version ( $\kappa=0.48$ ) (143). We used a combination of children and parent reports of depressive symptoms in order to obtain the most reliable information (143).

*Exposure Variable* – The four types of life events used in this study (separation, death, family environment, social adversity) were adapted from the research on types of life events conducted by Grover et al. (2005). The types of events included: 1) separation events (move to a new home, start a new school, parents separate, parental divorce, you break up with a girl/boyfriend, a close friend moved far away, a family member went to jail), 2) death events (your pet died, a close friend died, a close family member died), 3) social adversity events ( you were victim of a crime, you saw a crime, a family member

was arrested, a family member has an alcohol/drug problem), and 4) family environment events (parents argue more, have a new brother/sister, have a new stepfather/stepmother, you got sick or injured, a family member has a mental or emotional problem, family member was sick or injured). See Table 4.2 for the complete list of types of life events. Each type of life event was an aggregate of positive responses to the life events included in that category. The life events used in this study were derived from a list of 46 items from the Life Events Checklist (157).

*Potential Confounders and Effect Modifiers* – Potential confounding covariates were identified through a literature review on types of life events and depression, and were based on risk and protective factors described in Hill’s Family Stress Theory (170). Socio-demographic variables included: age (integer in years), gender (reported by the interviewer), place of residence (San Juan, Puerto Rico; and South Bronx, New York), family composition (single or two biological/other parent family), per capita household income (calculated by dividing household income by the number of household residents), and parental education (less than high school, high school, more than high school).

Parent/caregiver **received** social support was based on the count of positive responses to three out of 15 items selected from the Parent Social Support scale. We calculated the internal consistency for different combinations of items and selected the items that yielded the highest reliability coefficient (Cronbach’s  $\alpha = .70$ , at wave 1). The items focused on how often a parent gets together with family members, how often parents attend family gatherings, and how often family members take care of the respondent’s

children. Similar concepts on received social support can be found in the literature (128, 175, 176). Responses ranged from 0 = *never/once a year or less*, to 3 = *at least once a week* for the three items.

One item was selected from the Parent Social Support scale to measure parent/caregiver **perceived** social support. Responses to the item ranged from 0 = *never/once a year or less*, to 3 = *at least once a week*: “In general how satisfied are you with the amount of support that you receive in your life.”

Parent/caregiver coping was a count variable of positive responses to all questions in the Parental Coping scale. The scale consisted of eight items ranging from 0 = *almost never* to 2 = *often* for all items such as “Have you felt that you were unable to control the important things in your life?” (reverse coded) and “Have you successfully dealt with irritating life hassles?” The internal reliability of this scale was calculated for this study (Cronbach’s  $\alpha = .70$ , at wave 1) and was found to be in the acceptable range (238).

Place of residence, youth support from parents, and youth coping were analyzed as potential effect modifiers. Place of residence (San Juan, Puerto Rico and the Bronx, New York) was recorded by the interviewer in the Profile section. In a previous study, internalizing disorders were found to vary by place of residence but the differences were accounted for by youth’s exposure to violence and experiences of discrimination (178). Aggregated positive responses to the Parent/Child Relationship scale measured youth support from parents. The scale has 12 items and when calculated for this study, it was

found to have good reliability (Cronbach's  $\alpha = .74$ , at wave 1). Responses range from 0 = *rarely or never* and 1 = *sometimes or often* for all items. Youth coping was derived from the Ways of Coping scale which consisted of 5 items ranging from 0 = *rarely or never* to 2 = *sometimes or often*. The items on the scale were only measured at wave 1 and categorized into two levels (low= $\leq 3$  items, high= $\geq 3$  items) based on the mean (3.28 items). The reliability for several combinations of Ways of Coping items was calculated. The best combination included the full five items and was retained despite its low reliability (Cronbach's  $\alpha = .45$ , at wave 1) because it is based on theory and will allow the comparison of our results to other Boricua Youth Study studies (180).

### *Data Analysis*

Univariate analyses were conducted to generate descriptive statistics and to check for missing values, errors, and outliers. Bivariate analyses were conducted to identify potential confounders and multiplicative effect modification was tested by adding an interaction term to the model. We assessed the internal consistency of all our study scales by calculating correlations between scale items in the full analytic sample using Cronbach's alpha coefficient. Multicollinearity was tested using tolerance tests with the standard cutoff of 0.1 and tolerance values were found to be in the acceptable range between 0.97 and 0.99. A log-linear Poisson model was used to test the association between the types of life events (social adversity, separation, death, family environment) in the previous 12 months at wave 1 and depressive symptoms at wave 2, and types of life



events at wave 2 and depressive symptoms at wave 3 among youth with no depressive symptoms at wave 1.

Selection of covariates and descriptive statistics were conducted using SAS<sup>TM</sup> Software Version 9.3. Final models were evaluated with SUDAAN® software (release 11, 2012) (183) which is ideal for repeated measures and to adjust for cluster correlations resulting from multistage design. Sampling weights were used in all analyses to adjust for different probabilities of selection and to be representative of the age and gender distribution of the 2000 census. All p-values were considered significant at the  $< 0.05$  level.

### *Results*

Table 4.1 shows mean depressive symptoms at wave 2 for 10-13 year old youth without depressive symptoms at wave 1 by socio-demographic characteristics and types of life events at wave 1. Overall, mean depressive symptoms were higher for youth who experienced any of the four types of life events compared to youth who did not experience any type of life events. Overall, mean youth support from parents, parent **received** social support, parent **perceived** social support, and parent coping was lower for youth who experienced any of the four types of life event compared to children who did not experience any type of life event.

Table 4.2 is a list of life events used in the Boricua Youth Study by type of event.

Although not shown here, 63.2% of youth experienced separation events (e.g. move to a

new home, start a new school, parents separate) compared to 41.8% who experienced death events (e.g. your pet died, a close friend died), and 22.6% who experienced social adversity events (e.g. you were victim of a crime, you saw a crime).

Table 4.3 shows that a unit increase in social adversity events [ $b(SE)=0.72(0.12)$ ,  $p<0.0001$ ] results in a 105% increase in depressive symptoms; a unit increase in family events [ $b(SE)=0.41(0.03)$ ,  $p=0.0037$ ] results in a 50.7% increase in depressive symptoms; a unit increase in separation death events [ $b(SE)=0.43(0.14)$ ,  $p=0.0033$ ] results in a 53.7% increase in depressive symptoms; and, a unit increase in separation events [ $b(SE)=0.28(0.08)$ ,  $p=0.0013$ ] results in a 32.3% increase in depressive symptoms. Youth support from parents is a significant confounder in the association between all types of events and depressive symptoms. Parent coping was a significant confounder in the association between social adversity events and depressive symptoms. Youth coping, youth support from parents, youth self-esteem, and place of residence were tested as effect modifiers by including an interaction term in the final model but they did not modify the association between types of life events and depressive symptoms.

Figure 1 shows mean depressive symptoms at wave 2 with confidence intervals by types of life events at wave 1 for 10-13 year old youth with no depressive symptoms at wave 1. Mean depressive symptoms were consistently higher for youth who experienced types of events compared to youth who experienced no events. Mean depressive symptoms were highest for social adversity events, followed by separation events, and then death events.

## *Discussion*

Research shows that the experience of life events is significantly associated with depression (37, 206). More specifically, certain types of life events (e.g. severe loss, interpersonal trauma) increase the likelihood of developing depression (164, 239). Overall, our findings lend support to these studies and as expected, the association between types of events (e.g. social adversity, death, and separation events) and depressive symptoms varied in strength. We found that the percentage of separation events being reported was higher than the percentage of death and social adversity events however the results suggest that although not as frequent, social adversity events had a greater negative impact on psychological well-being.

Our study found that youth support from parents did not modify any of the associations between type of life events and depressive symptoms, but was a significant risk factor. These results support the literature that shows that family and personal resources, and in particular parent's social support have been found to promote youth mental health (240). Youth coping, youth self-esteem, or place of residence were tested as moderators of the association but none of the interaction terms were significant indicating that they were not significant effect modifiers.

There are several strengths to the present study. Depressive symptom are assessed with a measure that has been found to be reliable and valid (DISC-IV) (142). To our knowledge there are no other longitudinal studies of the association between types of life events and

depressive symptoms among Puerto Rican youth. Looking at different types of life events provides an opportunity to understand how each type of life event impacts depressive symptoms (102, 241).

Several limitations are identified for this study. First, although the reliability of depressive symptoms was found to be substantial in this study ( $\kappa=0.64$ ) (142), depressive symptoms do not constitute a diagnosis of depression. Second, it is difficult to establish causality between types of life events and depressive symptoms because each can modify the reporting of the other (219). Third, the recall of certain types of events may decrease at different rates over time, and recall is dependent on the event (159, 160). Fourth, we do not know which combinations of types of life events are experienced by each individual so it is possible that more than one type of life event may be experienced by the same individual (231). In addition, each type of life event may have included both positive and negative life events and therefore their effect on depressive symptoms may have been weakened. Fifth, children excluded from the study had more depressive symptoms and experienced more life events. Last, in SUDAAN the overdispersion of negative answers results in larger standard errors and results are more conservative

Future studies may examine the extent to which single life events within types of life events (e.g. death of a family member, death of a close friend, death of a pet) contribute to the association of type of life event with depressive symptoms. Likewise, studies may examine different ways of categorizing life events and how these categories affect depressive symptoms. A ‘type of life event’ variable that includes four levels (i.e. ‘social

adversity events only', 'death events only', 'separation events only', and 'family environment events only') should be created to allow comparison of the magnitude of effect between types of life events and depressive symptoms. Last, future studies should further explore possible mechanisms for developing depressive symptoms by type of life events.

The identification of risk and protective factors that contribute to the early development of depressive symptoms is important since early onset depression has lifelong economic, social and occupational outcomes (242). Relying on standard diagnostic tools are ideal to identify youth meeting the criteria for a diagnosis of depression but knowledge of a diagnosis is not enough to detect youth who present with sub-clinical levels of depression (do not meet the criteria for a diagnosis) (95). Youth with sub-clinical levels of depression will not get treated and are at increased risk of developing depression later in life (194, 243). Using symptoms from the DISC Predictive Scale for depression coupled with additional measures such as reports of life events may prove useful in predicting the course of depression. This study shows that separation, death, and social adversity types of life events are useful predictors of depressive symptoms among 10-13 year old Puerto Rican youth and that youth support from parents is a significant protective factor in the association between types of life events and depressive symptoms. These findings may be useful to consider when trying to identify youth at risk of developing depression.

*Tables*

Table 4.1. Mean Depressive Symptoms (wave 2) by Socio-Demographic Characteristics (wave 1) and Type of Life Event (wave 1) for 10-13 Year Old Youth without Depressive Symptoms at Wave 1 (weighted)

	<b>Total</b> (n=1,044)	<b>No Social Adversity Events</b> (n=784)	<b>Social Adversity Events (1-4)</b> (n=260)	<b>No Separation Events</b> (n=420)	<b>Separation Events (1-7)</b> (n=624)	<b>No Death Events</b> (n=553)	<b>Death Events (1-3)</b> (n=491)	<b>No Family Environment Events</b> (n=757)	<b>Family Environment Events (1-6)</b> (n=287)
<b>Bronx</b>		0.19	0.22	0.17	0.33	0.18	0.43	0.21	0.45
<b>Puerto Rico</b>		0.58	0.76	0.17	0.49	0.32	0.36	0.27	0.58
<b>Female</b>		0.20	0.69	0.27	0.37	0.28	0.40	0.28	0.44
<b>Male</b>		0.17	0.52	0.08	0.34	0.13	0.44	0.17	0.51
<b>Age Distribution (%)</b>									
10		0.00	0.66	0.00	0.10	0.06	0.07	0.07	0.01
11		0.27	0.30	0.12	0.36	0.13	0.41	0.19	0.46
12		0.19	0.43	0.11	0.27	0.25	0.21	0.18	0.39
13		0.10	0.73	0.26	0.43	0.23	0.33	0.25	0.32
<b>Mother's Education (%)</b>									
Less than High School		0.25	0.38	0.08	0.37	0.15	0.44	0.18	0.66
High School Diploma/GED		0.15	0.62	0.17	0.33	0.21	0.37	0.21	0.44
More than High School		0.15	0.88	0.40	0.32	0.28	0.44	0.32	0.42
<b>Family Composition (Number of</b>									

<b>Parents Living in Household) (%)</b>									
Two									
Biological/Other	0.17	0.68	0.20	0.34	0.18	0.44	0.21	0.47	
Parent									
One									
Biological/Other	0.22	0.54	0.14	0.37	0.23	0.40	0.24	0.48	
Parent									
<b>Diagnosed</b>									
<b>Maternal</b>									
<b>Depression (%)</b>									
Yes	0.44	1.07	0.19	0.75	0.69	0.58	0.23	0.39	
No	0.18	0.58	0.17	0.33	0.18	0.41	0.02	1.80	

Table 4.2. List of Life Events used by the Boricua Youth Study Categorized by Type of Life Events

### **Social Adversity**

During the last 12 months were you the **victim** of a crime, a violent act, or assault?

During the last 12 months, did you **see a crime or accident** where someone was mugged, hurt or killed?

During the last 12 months, was **someone in your family arrested**?

During the last 12 months, did a **family member have a drug or alcohol problem** (not including you)?

### **Separation**

During the last 12 months, did you **move to a new home** (permanently, not a temporary residence that is not your home)?

During the last 12 months, did you start **going to a new school**?

During the last 12 months, did your **parents separate**?

In the last 12 months, did your **parents get divorced**?

During the last 12 months, did you **break up** with a girlfriend or boyfriend?

During the last 12 months, did you **lose a close friend** not by death, or did a **close friend move far away**?

During the last 12 months, did **someone in your family go to jail**?

### **Death**

During the last 12 months, did a **close friend die**?

During the last 12 months, did **someone in the family that you loved a lot die**?

During the last 12 months, did a **pet of yours die**?

### **Family Environment**

During the last 12 months, did your **parents argue more than previously**?

In the last 12 months, did a **new brother or sister arrive in your home** (because one was born, or one moved into the household)?

During the last 12 months, did a new **stepmother or stepfather move into your house**?

During the last 12 months, did you get **seriously sick or injured**?

During the last 12 months, did a **family member** (not including you) **have a mental or emotional problem**?

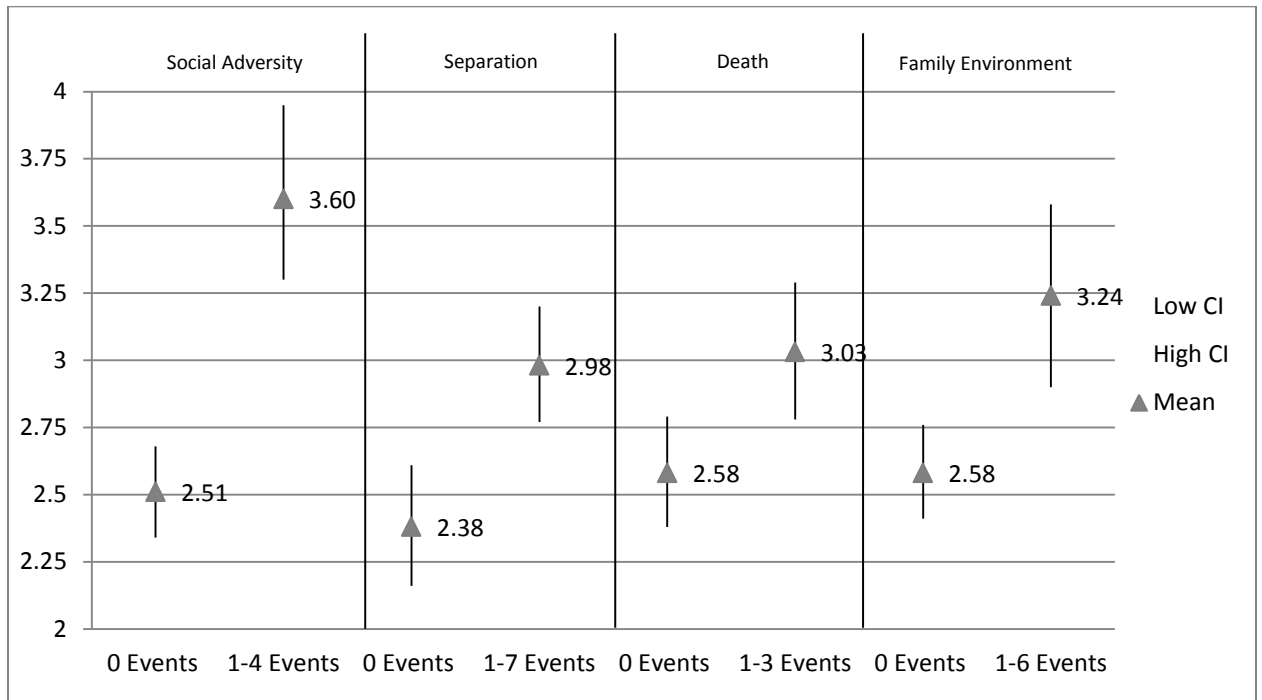
During the past 12 months, was **someone in your family seriously sick or injured**?



Table 4.3. Log-Linear Regressions of Separation, Death, and Social Adversity Events in the Last 12 Months and Depressive Symptoms

	<b>Unadjusted Model</b>			<b>Adjusted Model</b>		
	<b>b</b>	<b>SE</b>	<b>p-value</b>	<b>b</b>	<b>SE</b>	<b>p-value</b>
<b>Separation Events</b>	0.28	0.08	<b>0.0013</b>	0.27	0.08	<b>0.0022</b>
Youth Support from Parents				-0.11	0.04	<b>0.0020</b>
<b>Death Events</b>	0.43	0.14	<b>0.0033</b>	0.43	0.14	<b>0.003</b>
Youth Support from Parents				-0.12	0.04	<b>0.0017</b>
<b>Social Adversity Events</b>	0.72	0.12	<b>&lt;0.0001</b>	0.68	0.16	<b>&lt;0.0001</b>
Youth Support from Parents				-0.1	0.04	<b>0.0087</b>
Parent Coping				-0.09	0.04	<b>0.0132</b>
<b>Family Events</b>	0.41	0.14	<b>0.0037</b>	0.39	0.14	<b>0.0068</b>
Youth Support from Parents				-0.11	0.04	<b>0.0038</b>

Figure 1. Mean Depressive Symptoms (wave 2) by Type of Life Event (wave 1) for 10-13 Year Old Youth with No Depressive Symptoms at Wave 1



## **Chapter 5 – Association of Child Maltreatment with Depressive Symptoms among Puerto Rican Youth**

This manuscript follows the authors' instructions for the journal Child Abuse and Neglect at <http://www.journals.elsevier.com/child-abuse-and-neglect/>

### *Abstract*

The experience of single and multiple types of child maltreatment has been strongly associated with depression. However, little is known about maltreatment and depressive symptoms among Puerto Rican youth as the result of using broadcategories to describe Latinos. This study examines the predictive strength of different types of lifetime child maltreatment (i.e. physical, sexual, and emotional abuse, and neglect), and the effect of youth support from parents, youth coping, youth self-esteem, and place of residence on depressive symptoms among Puerto Rican youth. Secondary data analyses were performed using three annual waves (2000-2004) of data from the Boricua Youth Study. The sample consists of 855 10-13 year old Puerto Rican youth living in New York and Puerto Rico with no depressive symptoms at wave 1. Our results indicate that close to one in four children experienced some type of lifetime maltreatment. Physical abuse only was the most common type of maltreatment (12.0%), followed by neglect only (4.6%), sexual abuse only (3.8%), and multiple maltreatment (3.4%). The mean depressive symptoms for youth who experienced multiple maltreatment was 1.85 higher than the mean depressive symptoms for children who experienced no maltreatment. We found no association between different types of lifetime child maltreatment at wave 1 and depressive symptoms at wave 3.

## *Introduction*

Depression is one of the most common mental disorders in adolescence with serious consequences which extend into adulthood. Adolescent depression is strongly associated with psychiatric comorbidity, school failure, social difficulties, the adoption of risky behaviors, obesity, physical impairment and suicide (5, 14, 16). Early onset depression often leads to the recurrence of depression, severe depressive disorders and major functional impairment in adulthood (9, 20). In turn, adult depression has been linked to high personal, social and economic costs causing a substantial loss in human capital (\$57.5 billion total expenditure for mental disorders in 2006) (3, 21, 23, 244).

Depression has been strongly associated with the experience of lifetime child maltreatment (82). Maltreatment (i.e. physical, sexual, and emotional abuse, and neglect) (80) is also a serious public health problem with significant health, social, and economic costs (81). It is estimated that the average lifetime cost of a non-fatal child maltreatment case in the U.S. is approximately \$210,000 in 2010 dollars (81), including productivity losses, and medical, child welfare, criminal justice, and special education costs. Although not all occurrences of child maltreatment are reported, the number of officially reported cases highlights a widespread problem (88). Findings from the Developmental Victimization Survey, a nationally representative sample of children 2-17 years of age, indicate that 1 in 7 children in the U.S. will experience some form of child maltreatment in their lifetime (90). In 2011, child maltreatment rates among Latinos (8.6 per thousand)

were comparatively higher than the rates for non-Hispanic Whites (7.9 per thousand), however, Latino cases have been found to be underreported (91).

Most studies of child maltreatment among Latinos do not distinguish specific Latino subgroups (92) with the exception of Puerto Ricans who live in a U.S. territory. As such, Puerto Rico is included in the National Child Abuse and Neglect Data System (NCANDS), a federally sponsored system established in response to the Child Abuse Prevention and Treatment Act of 1988 to collect and analyze annual data on child abuse and neglect (89). Estimates from the National Child Abuse and Neglect Data System indicate that there were 10 per 1,000 child maltreatment victims in Puerto Rico compared to 9.2 per 1,000 in the U.S.

Early research on child maltreatment focused on the effects of single types of maltreatment however more recent studies have shown that children who are exposed to one type of maltreatment are often exposed to other types (93). As a result, researchers started examining the combined effects of different types of child maltreatment and found that exposure to multiple types of maltreatment represent a substantial risk for mental health disorders (94), and major depression in particular (86).

The present study is based on the ecological-transactional model developed by Cicchetti and Lynch (137). In this model, the balance between risk and protective factors present at different ecologic levels (i.e. community, family) interact to influence the course of the child's psychological development and functioning across the life-span. For example,

child maltreatment is believed to disrupt the conditions that lead to normal development, and will result in maladaptive cognitive and behavioral strategies, and psychopathology (88).

This longitudinal study aims to examine a sample of 10-13 year old Puerto Rican youth living in New York and Puerto Rico from the Boricua Youth Study to determine the predictive strength of individual and multiple types of child maltreatment on the development of depressive symptoms. We hypothesize that an increase in individual or multiple types of child maltreatment results in an increase of depressive symptoms, and that the strength of the association varies by type of maltreatment. In addition, we want to test whether ways of coping, self-esteem, youth support from parents, and place of residence have a potential moderating role in the association between child maltreatment and depressive symptoms.

### *Methods*

The study background, design, and methodology are described in detail by Bird et al. (2006). In brief, Boricua Youth Study (BYS) data were collected in three annual waves between summer 2000 and fall 2004. The BYS is a longitudinal study that uses representative community samples of 5-13 year old children at wave 1 at two sites: the Bronx, New York (n= 1,138) and San Juan Puerto Rico (n=1,353). Children and their parents/caretakers were interviewed at wave 1 and re-interviewed at two one-year intervals after that. The three waves of interviews were conducted by trained lay

interviewers in Spanish or English based on language preference. The samples were weighted to adjust for differences in their probability of selection due to the multistage sample design. The BYS provides a wealth of information on family socio-demographic characteristics, child psychopathology and other risk factors for mental disorders.

The final analytic sample included 855 Puerto Rican children 10-13 years old who met the following conditions: 1) had wave 1 data on lifetime child maltreatment; and 2) had wave 3 data on depressive symptoms. Excluded from the analytic sample were youth with depressive symptoms at wave 1 (n=186) or youth missing depressive symptoms at wave 3 (n=122). We excluded children with depressive symptoms at wave 1 in order to establish a temporal sequence between child maltreatment at wave 1 and the development of depressive symptoms at waves 3. Children 5-9 years of age were excluded from the analytic sample because the instrument measuring psychiatric disorders in this age group has poor reliability (139). Institutional Review Board approval for this project was obtained from both the University of Puerto Rico and the University of Maryland College Park.

*Outcome variable* – Depressive symptoms (reported at wave 3) was the count of symptoms experienced in the past 12 months. The count was the combined measure of responses to 9 questions that have been found to accurately predict depression (with higher scores indicating more depressive symptoms). Responses were provided by both children and their primary parents/caregivers. We concentrated on the count of depressive symptoms among our young population because we had an insufficient number of youth



with diagnosed depression and symptom scales have better test-retest reliability than categorical diagnoses that use a threshold number of criteria for depression (142).

Depressive symptoms were derived from the questions found in the major depression and dysthymia schedule of the National Institute of Mental Health Diagnostic Interview Schedule for Children, Version IV (DISC-IV) (142). Both the English and Spanish versions of the DISC-IV are commonly used instruments to ascertain a wide range of child and adolescent psychiatric diagnoses. The Spanish version of DISC-IV is the only one of two instruments with psychometric data available for U.S. Latinos (151). The test-retest reliability for both the Spanish and English versions was found to be moderate ( $\kappa=0.48$ ) (143). (149). A combination of children and parent reports was used to obtain the most complete information on depressive symptoms since reliability for last year reports from parents only ( $\kappa=0.27$ ) and children only ( $\kappa=0.12$ ) was found to be low to fair (143).

*Exposure Variable* – Lifetime child maltreatment was constructed using the answers to 11 items from the Traumatic Experiences Questionnaire (TEQ) (see Appendix 9). The questionnaire includes self-report items to assess physical and sexual abuse, and neglect by family and/or non-family members. The maltreatment measure was a combination of lifetime experiences of maltreatment assessed at wave 1. Physical abuse was derived from four questions from the child version of the Parental Discipline Scale (66). Physical abuse included having ever been hit by a caregiver with an object sometimes or many times, or ever been hit by a caregiver with a fist, kicked hard, beaten very hard, or purposely injured at least once. Sexual abuse included two items derived from a scale

developed by Finkelhor and Dzuiba-Leatherman (1979), and was defined as being forced to look at or touch an adult's or older child's private parts, or having an adult or older child ever try to touch, grab, or kiss the child in a sexual way one or more times. Neglect was derived from four items in the Parental Discipline Scale (66): having ever been left alone at least two times, or left without food, necessary medical care, or having a caretaker who could not take care of the child due to substance abuse at least one time. Based on the co-occurrence of different types of maltreatment, the variable was categorized into five levels depending on the type of maltreatment: no maltreatment, neglect only, physical abuse only, sexual abuse only, and multiple maltreatment (2 or more types of maltreatment). This five level maltreatment variable is similar to the variable used by Gonzalez-Tejera et al. (2005), and Sledjeski et al. (2009) in their studies. The reliability of sub-scales included in the TEQ was previously calculated and found to be poor to good: physical abuse (Cronbach's alpha = .70), neglect (Cronbach's alpha = .47), sexual abuse (Cronbach's alpha = .55), and multiple maltreatment (Cronbach's alpha = .72) (95).

*Potential Confounders and Effect Modifiers* – Potential confounders were identified through a literature review on types of child maltreatment and depression, and through the ecological-transactional model (137). In this study we used various socio-demographic variables assessed at wave 1: age (integer in years), gender (reported by the interviewer), family composition (single or two biological/other parent family), per capita household income (calculated by dividing household income by the number of household

residents), and parental education (less than high school, high school, more than high school).

Parent/caregiver coping was the count of positive responses to questions in the Parental Coping scale. The scale consisted of eight items ranging from 0 = *almost never* to 2 = *often* for all items such as “Have you felt that you were unable to control the important things in your life?” (reverse coded) and “Have you successfully dealt with irritating life hassles?” The internal reliability of this scale was calculated for this study (Cronbach’s  $\alpha$  = .70, at wave 1) and was found to be in the acceptable range (238).

Exposure to community violence was based on 11 items from the Exposure to Violence questionnaire (Raia, 1995, Richters and Martinez, 1993). Each item included questions about the types of exposure to community violence: it happened to self, saw it happen to someone, and heard of it happening to someone. The measure was weighted for different levels of exposure, so the response was coded 3 if the youth experienced direct exposure, the response was coded 2 if it happened to someone else, and the response was coded 1 if the youth heard about the violence happening to someone else,. The higher scores indicated higher exposure to violence.

Co-morbidity was a dichotomous variable based on parent reports of mental health disorders and impairment other than depression as determined by the questions from the National Institute of Mental Health Diagnostic Interview Schedule for Children, Version IV (DISC-IV) (142). Co-morbidity included conduct disorder, oppositional defiant

disorder, social phobia, separation anxiety, panic disorder, generalized anxiety, post-traumatic stress disorder, alcohol, nicotine and other substances use, and ADHD.

Potential effect modifiers were place of residence, youth support from parents, youth self-esteem, and youth coping. Place of residence had two levels: San Juan, Puerto Rico and the Bronx, New York and was recorded by the interviewer in the Profile section.

Sledjeski et al. found that site differences in maltreatment prevalence between Puerto Rico and New York emerged over time specifically for physical abuse while risk factors were the same at both sites (173). In addition, Ramos et al. found higher levels of internalizing symptoms, including depressive symptoms among youth living in New York compared to youth living in Puerto Rico. However, the differences in the level of discrimination and exposure to violence between the two contexts accounted for the results (95). Youth support from parents was derived from a count of positive responses to 12 questions from the Parent/Child Relationship youth questionnaire. The questions included how often the parent/caretakers do things with the child, help make important decisions, take time to talk about things, talk about problems the child had at school or with a friend, play some sport/game, help with school work, go to the movies together, come see the child for a special activity, pay attention to what the child says, the child does what the parent asks them to do, how often the child talks back, how often the child helps parents with a task. We calculated the reliability of the scale and it was acceptable (Cronbach's  $\alpha = .74$ , at wave 1). Responses ranged from 0 = *rarely or never* and 1 = *sometimes or often* for all items. Youth coping consisted of positive answers to 5 questions derived from the Ways of Coping scale. Possible responses ranged from 0 =

*rarely or never* to 2 = *sometimes or often*. The reliability of this measure was low (Cronbach's  $\alpha = .36$ , at wave 1) but the measure was kept because it is based on theory and results can be compared to other Boricua Youth Study studies (180). Questions were about school and athletic performance, competence, social acceptance, behavioral conduct and physical appearance. Youth self-esteem was a count to 8 questions from the youth Self Esteem questionnaire. We calculated the reliability of the scale and found it to be good (Cronbach's  $\alpha = .90$ , at wave 1).

### *Data Analysis*

Descriptive analyses were conducted to assess the distributions of the variables and to check for errors and missing values. GLM procedures were used to examine mean depressive symptoms for socio-demographic variables by youth support from parents. Youth support from parents was analyzed separately as a continuous variable, and as a binary measure based on mean social support: low (<10 items) and high ( $\geq 10$  items) social support for the purpose of presenting results. A power analysis was conducted using STATA/IC 10.0 for the study sample and the actual estimated power output was 1.0 ANCOVA method).

Covariates were identified as potential confounders when they were significantly associated ( $\alpha < 0.10$ ) (184, 185) with child maltreatment or depressive symptoms (conditional on exposure). Identified confounders were added one at a time to the unadjusted model for further testing, and if a 5% change was observed in the main effect

they were further confirmed as confounders. Interaction terms were added to the final model to assess multiplicative interaction. Reliability was assessed calculating Cronbach's alpha coefficients for all our study scales in the full analytic sample. Tolerance tests with the standard cutoff of 0.1 were used to assess multicollinearity. Tolerance values were found to be in the acceptable range between 0.97 and 0.99.

We used a log-linear Poisson model to examine the association between lifetime child maltreatment reported in wave 1 and depressive symptoms in wave 3 among youth with no depressive symptoms at wave 1. The covariates used for analyses were reported at wave 1. We first present an unadjusted analysis of the association between child maltreatment and depressive symptoms, an adjusted analysis that includes significant covariates, and an adjusted model that includes significant covariates and the interaction term between lifetime child maltreatment and youth support from parents. All beta coefficients were exponentiated to calculate the effect of each covariate on depressive symptoms.

Descriptive statistics were conducted using SAS<sup>TM</sup> Software Version 9.3. Covariates and final models were evaluated with SUDAAN<sup>®</sup> software (release 11, 2012) (183) which is ideal to handle repeated measures and cluster correlations resulting from the multistage design. Sampling weights were used in all analyses to adjust for unequal probabilities of selection due to the complex design, and to be representative of the age and gender distribution of the 2000 census. All p-values were considered significant at the  $< 0.05$  level.

## *Results*

Table 5.1 shows weighted results for socio-demographic characteristics and mean depressive symptoms at wave 1 for 10-13 year old Puerto Rican youth who had no depressive symptoms at wave 1. Approximately 24% of children experienced some type of maltreatment during their lifetime. 'Physical abuse only' was the most commonly reported type of abuse (12.0%), followed by 'neglect only' (4.6%), 'sexual abuse only' (3.8%) and 'multiple maltreatment' (3.4%). The proportion of children reporting any child maltreatment was higher for youth who did not have support from parents (28.4%) compared to those who had support from parents (20.6%). Mean depressive symptoms were highest for 'multiple maltreatment'. The mean depressive symptoms for youth who experienced 'multiple maltreatment' was 1.85 times the mean depressive symptoms for youth who experienced no maltreatment. Mean depressive symptoms were higher for youth living in a two parent/caregiver household compared to those who lived in single parent/caregiver household, for youth who had depressed mothers compared to youth living with mothers with no depression, and for youth who had a co-morbid mental disorder compared to those who had no co-morbid disorders.

Poisson log-linear regressions were conducted to examine whether different types of child maltreatment predicted follow-up depressive symptoms but no significant association was found for 'neglect only' [b(SE)=-0.57(0.99); p=0.5630], 'physical abuse only' [b(SE)=0.49(0.45); p=0.2778], 'sexual abuse only' [b(SE)=-0.41(0.89); p=0.6448] and 'multiple maltreatment' [b(SE)=0.43(0.95); p=0.6546] (table 5.2).

## *Discussion*

We found that a history of abuse was common in our Puerto Rican youth sample (24%) supporting previous research. However, the prevalence of each type of abuse was lower than in other studies examining an older adolescent population in Puerto Rico (95, 173). As expected, the mean depressive symptoms for youth who experienced ‘multiple maltreatment’ was the highest.

Our regression results do not show an association between single (neglect only, physical abuse only, and sexual abuse only), multiple maltreatment and depressive symptoms. The lack of association cannot be explained by the lack of power. These findings are surprising since the significant association between physical abuse (245), sexual abuse (246), neglect (82), and depression has been substantially documented. In addition, more recent studies on the co-occurrence of different types of maltreatment have found that multiple maltreatment is strongly linked to depression (247).

We wanted to test the ecological/transactional model to examine if family and personal resources promote youth mental health (240). However, we found no main effects for such resources. Results in the literature talk about the buffering role that social support (218, 248, 249), coping styles (250), and youth self-esteem (251) play on the association between stressful events and depressive symptoms. However, we were unable to find any significant effect moderation.



This study to our knowledge is the first study that attempted to examine the longitudinal association between single and multiple types of child maltreatment and depressive symptoms among Puerto Rican Youth. Study strengths include the use of depressive symptoms which are assessed with the DISC-IV which is a widely used reliable and valid instrument (142). The BYS is a powerful dataset that includes a wide variety of risk factors with adequate psychometric properties. Lastly, SUDAAN is a powerful tool for analyzing repeated measures and cluster-correlated data like in the Boricua Youth Study.

There are several limitations in the study. First, in our model we excluded youth who had depressive symptoms at wave 1 but in doing so we may have excluded those who were most affected by lifetime child maltreatment and may experience more depressive symptoms at wave 3. Second, a count of depressive symptoms does not constitute a diagnosis of depression despite the fact that the reliability of depressive symptoms scales is substantial ( $\kappa=0.64$ ) (142). Third, child maltreatment is usually underreported and may have biased the results towards the null (93). Lastly, the children who were excluded from the study had more depressive symptoms and experienced more life events.

Future studies may look at the association between lifetime child maltreatment and change in depressive symptoms between waves 1 and 3. Another study could examine time as an effect modifier in the association between child maltreatment and mean number of depressive symptoms among those who had no depressive symptoms, those who met the criteria for minor depression and those who met the criteria for major

depression at wave 1. In addition, future research may examine the interaction between types of maltreatment and youth support from parents by category of abuser and severity of maltreatment. Specifically, what is the effect of support from a caregiver who is the abuser compared to a caregiver who is not the abuser on the association between child maltreatment and depressive symptoms. Also, studies should examine the effects between lifetime abuse, abuse in the last 12 months, a combination of lifetime abuse and abuse in the last 12 months, and depressive symptoms. Lastly, studies should include the association between psychological abuse and depressive symptoms in the family context. The 2012 NCANDS report shows that psychological abuse is the second most common type of abuse (44.4% of reports) in Puerto Rico after neglect (63.5% of cases) and is over 5 times higher than for the U.S. (89).

Given the serious consequences of child maltreatment and depression, it is important to further refine our understanding of the association between the two. We need to identify the risk factors that contribute to the evolution of sub-clinical depression into major depression. Many youth who do not meet the criteria for depression have been shown to be at greater risk of developing depression later in life (194, 243) and have been found to be significantly impaired, and to use more mental health services than children with diagnosed depression (95). We need to keep highlighting the importance of developing interventions to effectively screen for youth at risk of progressing to clinical depression.

*Tables*

Table 5.1. Socio-Demographic Characteristics and Mean Depressive Symptoms for 10-13 Year Old Puerto Rican Youth with No Depressive Symptoms at Wave 1

	<b>Total (%)</b>	<b>Total Mean (SE)</b>	<b>p-value</b>
<b>Child Maltreatment</b>			0.6533
No Maltreatment	76.3	0.20 (0.05)	
Neglect Only	4.6	0.27 (0.11)	
Physical Abuse Only	12.0	0.33 (0.21)	
Sexual Abuse Only	3.8	0.35 (0.26)	
Multiple Maltreatment	3.4	0.37 (0.26)	
<b>Age in Years</b>			0.0993
10	28.1	0.24 (0.07)	
11	24.7	0.33 (0.04)	
12	23.9	0.10 (0.04)	
13	23.3	0.24 (0.07)	
<b>Mother's Level of Education</b>			0.4998
< High School	41.4	0.18 (0.07)	
High School or GED	43.8	0.24 (0.07)	
> High School	14.9	0.31 (0.04)	
<b>Mother's Depression</b>			0.5050
No	95.6	0.21 (0.03)	
Yes	4.4	0.46 (0.19)	
<b>Place of Residence</b>			0.7771
Bronx	84.1	0.22 (0.05)	
New York	15.9	0.22 (0.05)	
<b>Gender</b>			0.6429
Male	47.6	0.22 (0.05)	
Female	52.4	0.22 (0.05)	
<b>Family Composition</b>			0.3758
Single Parent/Caregiver	54.9	0.19 (0.04)	
Two Parent/Caregiver	45.1	0.28 (0.06)	
<b>Exposure to Violence</b>			
No	47.7	0.14 (0.03)	
Yes	52.3	0.30 (0.06)	
<b>Co-Morbidity</b>			<b>0.0009</b>
No	87.8	0.15 (0.03)	
Yes	12.2	0.73 (0.19)	

Table 5.2. Log-Linear Poisson Regressions of Lifetime Child Maltreatment (Wave 1) on Depressive Symptoms (Wave 3)

<b>Model 1</b>			
	<b>b</b>	<b>SE</b>	<b>p-value</b>
<b>Child Maltreatment</b>			
No Maltreatment	ref.	ref.	ref.
Neglect Only	0.58	0.99	0.5581
Physical Abuse Only	0.45	0.43	0.3055
Sexual Abuse Only	0.41	0.88	0.6408
Multiple Maltreatment	0.27	0.96	0.7793

## **Chapter 6 - Conclusions and public health significance: Policy implications and long term relevance**

Depression is a serious public health problem with social, economic and educational costs throughout the life course that are too great to ignore (30). Depression is one of the most common mental disorders in adolescence (8) almost doubling between ages 13 and 18, with one in five adolescents reporting lifetime depression by age 18 (9, 10). Recent research started focusing on depressive symptoms as a continuum in which a high number and particular combinations of symptoms result in the diagnosis of a depressive disorder (19). In the early literature depressive symptoms among adolescents were viewed as a stage in normal development but studies now show that a high number of depressive symptoms are associated with psychosocial dysfunction and depression (32, 47). In addition, the early onset of depressive symptoms places youth at risk for higher rates of recurrence in adulthood (221). However, the course of depressive symptoms is still not well understood and while some youth with depressive symptoms progress to depression, others will not (48). Although some youth with depressive symptoms do not meet the criteria for a diagnosis of major depression they remain at a heightened risk for developing depression (19). Identifying relevant depressive symptoms at the earliest possible age and determining who will continue to have depressive symptoms is an alternative step in the prevention of depression.

In this study we identified life events as a significant risk factor for developing depressive symptoms, and our findings further support similar studies. For example, Sanchez et al. conducted a study in a similar age African-American population and found that the experience of life events across ecological levels (peer, family, and individual levels) resulted in an increase in depressive symptoms over time (252). In another study, Ge et al. examined the trajectory of depressive symptoms of 8<sup>th</sup> and 9<sup>th</sup> grade males and females from rural Iowa over an 11 year period and found a curvilinear trajectory with increases in depressive symptoms throughout early adolescence (98). However, more research is needed to identify other risk factors that determine the course of depressive symptoms, and to identify youth at risk for developing depression.

Internal and external factors such as youth coping, self-esteem, social support or life events have been researched extensively and are significantly associated with depression (252). Few studies have been conducted to explore the association between internal and external factors with depressive symptoms. However, measuring affect, behavior, and cognition is challenging because there is no gold standard (161). Often there is no consensus on what type of instrument to administer, while interviews are considered best by some, they are often lengthy and expensive to be used in a community setting (161). Checklists are short and easy to administer but self-report responses depend on the quality of the instrument, the person who is reporting and their reliability (162). Variations, conceptualizations, and measurements of key variables such as life events, coping, social support and self-esteem may explain the different findings on the effects of life events on depressive symptoms (134). In addition, the information provided through

a self-report is subjective, so retrospective self-reports may reflect the person's current emotional state and recall may be biased (165). Certain instruments were developed for a specific population and may not be reliable for other populations (28). Lastly, studying risk factors in Latino populations pose further challenges. Most studies group together Latino subpopulations, or have too small sample sizes for different Latino subgroups, or fail to study important demographic variables such as generation status or degree of acculturation (51).

Preventing the development of depressive symptoms at an early age is important to optimize the mental health and well-being of youth so they can reach their full potential. We need to further develop our understanding of how depressive symptoms may progress into depression among some youth and what factors play a role in this evolution. Our results indicate that depressive symptoms increase over time when youth experience life events whether 'total', 'negative', or 'positive or no effect'. We also found that depressive symptoms increase in the presence of certain types of life events and that some events may have a greater impact in the development of depressive symptoms. These findings could inform the development of a first-stage screening tool for youth at risk for developing depressive symptoms in community settings. We did not find any multiplicative effect modification however we found possible additive effect modification for youth coping. Youth coping was the sum of positive responses to the different coping styles the youth used. A possible explanation of the additive effect modification may be that as the number of life events increases and youth are faced with more challenges, youth who use a variety of coping styles are more effective. Our results

show that youth support from parents is a protective factor that needs to be cultivated as a resource when involving parents in interventions to improve the mental health of their children. More health care providers, caregivers, school personnel and other professionals in community settings need to get involved in identifying children at risk for developing depression. In particular, health care providers and school personnel can guide parents to focus on improving the mental health of their children.

Optimizing the mental health of youth is supported by federal policy. Healthy People 2020 seeks to “reduce the proportion of adolescents aged 12 to 17 years who experience major depressive episodes” (253). In addition, the U.S. Preventive Services Task Force recommends screening 12-18 year old adolescents for major depressive disorder to ensure their timely diagnosis, psychotherapy and follow-up(254).



## *Appendix I*

Mood disorders are a subset of mental disorders described in the Diagnostic and Statistical Manual of Disorders (DSM-IV). The main underlying feature of mood disorders is a disturbance in mood (inappropriate, exaggerated or a limited range of feelings). Mood disorders are divided into four categories: major depressive, dysthymic, cyclothymic and bipolar disorders. In this study, I focused on depressive symptoms as described in DSM-IV. Depressive symptoms include:

- Depressed or *irritable* mood most of the day (irritability is the only difference with an adult's diagnosis)
- Diminished pleasure or interest in all or most activities
- Significant weight loss
- Insomnia or hypersomnia
- Psychomotor agitation or retardation
- Fatigue or loss of energy
- Feelings of worthlessness or excessive guilt
- Diminished ability to think or concentrate
- Recurrent thoughts of death or suicidal ideation

The symptoms should not be due to the direct psychological effects of substance abuse, medication, a medical condition or bereavement. The approach to children and adolescent's mental health is markedly different than that of adults and the field of developmental psychopathology has provided a framework for conceptualizing childhood

psychopathology. In general, anhedonia (lack of pleasure), hopelessness, hypersomnia, weight change and drug use are more common among adolescents than in adults.(8)

The DISC-IV is a respondent-based interview that is a highly structured diagnostic instrument that requires answers without interpretation by the interviewer. It was originally developed for large epidemiological studies but since then has been used in clinical settings and for prevention and screening. It is usually administered by a non-clinician (a trained lay interviewer). The instrument was originally developed in 1979 and has undergone several changes to match different disease classification systems. The DISC-IV is based on DSM-IV and ICD-10 and was first introduced in the field in 1997. It is administered and scored with computer assisted software and is available both in English and Spanish. The DISC-IV assesses more than 30 child and adolescent psychiatric diagnoses including major depressive episode/dysthymia. There are two versions of the instrument: the DISC-P for parents or knowledgeable caretakers for 6-17 years old, and the DISC-Y for children and youths aged 9-17 years. Both versions include similar questions but use different pronouns depending on who is being interviewed. The DISC-IV includes an introduction module followed by 6 modules containing related diagnoses. The major depression and dysthymia module includes a total of 60 questions. The DISC-IV assesses the presence of a diagnosis occurring in the past 12 month and the past 4 weeks.(142)

I'm now going to ask you some questions about feeling sad and unhappy.

1. In the last year, that is since [NAME EVENT/NAME CURRENT MONTH of last year] was there a time when you often felt sad or depressed?

IF YES

- A. Was there a time in the last year when you felt sad or depressed for a long time each day?

IF NO, GO TO Q2

- B. Would you say that you felt that way a few days of the day?

## Appendix 2

In the last 12 months did your **parents get divorced**?

Yes .....0

No .....2

Refused .....7

Don't know.....9

**IF YES, ASK:**

A. Was the divorce **MOSTLY GOOD** for you or  
**MOSTLY BAD** for you?

Mostly good ..... 1

Mostly bad..... 2

Refused..... 7

Don't know..... 9

**IF A IS CODED "2", ASK B,  
OTHERWISE, GO TO Q6**

B. Please look at **CARD 16** and tell me how your  
parent's divorce has affected your life

Not at all or only a little... 1

A lot..... 2

Refused..... 7

Don't know..... 9

### Appendix 3

#### LIFE EVENTS CHECKLIST FOR ALL AGES

1. During the last 12 months, did you **move to a new home** (permanently, not a temporary residence that is not your home)?

**IF YES, ASK:** A. Was moving to a new home MOSTLY GOOD for you or MOSTLY BAD for you?

Mostly good .....

Mostly bad .....

Refused .....

Don't know .....

**IF A IS CODED "2", ASK B.**

**OTHERWISE, GO TO Q. 2.**

B. Please look at **CARD 16** and tell me how moving to a new home has affected your life. **(READ):**

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

2. During the last 12 months, did you start **going to a new school**?

**IF YES, ASK:** A. Was starting a new school MOSTLY GOOD for you or MOSTLY BAD for you?

Mostly good .....

Mostly bad .....

Refused .....

Don't know .....

**IF A IS CODED "2", ASK B.**

**OTHERWISE, GO TO Q. 3.**

B. Please look at **CARD 16** and tell me how starting a new school has affected your life. **(READ):**

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

3. During the last 12 months, did your **parents argue more than previously**?

**IF YES ASK:** B. Please look at **CARD 16** and tell me how your parents' arguing has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

4. During the last 12 months, did your **parents separate**?

**IF YES,ASK:** A. Was your parents' separating MOSTLY GOOD for you or MOSTLY BAD for you?

Mostly good .....

Mostly bad .....

Refused .....

Don't know .....

**IF A IS CODED "2", ASK B.**

**OTHERWISE, GO TO Q. 5.**

B. Please look at **CARD 16** and tell me how your parents' separating has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

5. In the last 12 months, did your **parents get divorced?**

**IF YES, ASK:** A. Was the divorce MOSTLY GOOD for you or MOSTLY BAD for you?

Mostly good .....

Mostly bad .....

Refused .....

Don't know .....

**IF A IS CODED "2", ASK B.**

**OTHERWISE, GO TO Q. 6.**

B. Please look at **CARD 16** and tell me how your parents' divorce has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

6. In the last 12 months, did **a new brother or sister arrive in your home**(because one was born, or one moved into the household)?

**IF YES, ASK:** A. Was having a new brother or sister MOSTLY GOOD for you or MOSTLY BAD for you?

Mostly good .....

Mostly bad .....

Refused .....

Don't know .....

**IF A IS CODED "2", ASK B.**

**OTHERWISE, GO TO Q. 7.**

B. Please look at **CARD 16** and tell me how having a new brother or sister has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

7. During the last 12 months, did a new **stepmother or stepfather** move into your house?

**IF YES, ASK:** A. Was this person moving into your house MOSTLY GOOD for you or MOSTLY BAD for you?

Mostly good .....

Mostly bad .....

Refused .....

Don't know .....

**IF A IS CODED "2", ASK B.**

**OTHERWISE, GO TO Q. 8.**

B. Please look at **CARD 16** and tell me how this person moving into your house has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

8. During the last 12 months, did you get **seriously sick or injured**?

**IF YES, ASK:** B. Please look at **CARD 16** and tell me how being seriously sick or injured has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

9. During the last 12 months were you the **victim** of a crime, a violent act, or assault?

**IF YES, ASK:** B. Please look at **CARD 16** and tell me how being the victim of a crime or assault has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

10. During the last 12 months, did you **see a crime or accident** where someone was mugged, hurt or killed?

**IF YES, ASK:** B. Please look at **CARD 16** and tell me how seeing a crime or accident where someone was mugged, hurt or killed has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

11. During the last 12 months, did you **break up** with a girlfriend or boyfriend?

**IF YES, ASK:** A. Was breaking up MOSTLY GOOD for you or MOSTLY BAD for you?

Mostly good .....

Mostly bad .....

Refused .....

Don't know .....

**IF A IS CODED "2", ASK B.**

**OTHERWISE, GO TO Q. 12.**

B. Please look at **CARD 16** and tell me how breaking up has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

12. During the last 12 months, did a **close friend die**?

**IF YES, ASK:** B. Please look at **CARD 16** and tell me how having a close friend die has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

13. During the last 12 months, did you **lose a close friend** not by death, or did a **close friend move far away**?

**IF YES, ASK:** B. Please look at **CARD 16** and tell me how losing a close friend has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

14. During the last 12 months, was **someone in your family arrested**?

**IF YES, ASK:** A. Was this person's being arrested MOSTLY GOOD for you or MOSTLY BAD for you?

Mostly good .....

Mostly bad .....

Refused .....

Don't know .....

**IF A IS CODED "2", ASK B.**

**OTHERWISE, GO TO Q. 15.**

B. Please look at **CARD 16** and tell me how this person's being arrested has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

15. During the last 12 months, did **someone in your family go to jail?**

**IF YES, ASK:** A. Was this person's going to jail MOSTLY GOOD for you or MOSTLY BAD for you?

Mostly good .....

Mostly bad .....

Refused .....

Don't know .....

**IF A IS CODED "2", ASK B.**

**OTHERWISE, GO TO Q. 16.**

B. Please look at **CARD 16** and tell me how this person's going to jail has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

16. During the last 12 months, did a **family member have a drug or alcohol problem**(not including you)?

**IF YES, ASK:** B. Please look at **CARD 16** and tell me how this person's drug or alcohol problem has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

17. During the last 12 months, did a **family member** (not including you) **have a mental or emotional problem?**

**IF YES, ASK:** B. Please look at **CARD 16** and tell me how this person's mental or emotional problem has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

18. During the past 12 months, was **someone in your family seriously sick or injured?**

**IF YES, ASK:** B. Please look at **CARD 16** and tell me how this person's sickness or injury has affected your life.

Not at all or only a little .....

A lot .....

Refused .....

Don't know .....

19. During the last 12 months, did **someone in the family that you loved a lot die?**

**IF YES, ASK:** B. Please look at **CARD 16** and tell me how this person's



death has affected your life.  
Not at all or only a little .....  
A lot .....  
Refused .....  
Don't know .....

20. During the last 12 months, did a **pet of yours die?**

**IF YES, ASK:** B. Please look at **CARD 16** and tell me how the death of your pet has affected your life.

Not at all or only a little .....  
A lot .....  
Refused .....  
Don't know .....

#### *Appendix 4*

#### List of Life Events Categorized by Type of Life Events

##### **Social Adversity**

During the last 12 months were you the **victim** of a crime, a violent act, or assault?

During the last 12 months, did you **see a crime or accident** where someone was mugged, hurt or killed?

During the last 12 months, was **someone in your family arrested**?

During the last 12 months, did a **family member have a drug or alcohol problem** (not including you)?

##### **Separation**

During the last 12 months, did you **move to a new home** (permanently, not a temporary residence that is not your home)?

During the last 12 months, did you start **going to a new school**?

During the last 12 months, did your **parents separate**?

In the last 12 months, did your **parents get divorced**?

During the last 12 months, did you **break up** with a girlfriend or boyfriend?

During the last 12 months, did you **lose a close friend** not by death, or did a **close friend move far away**?

During the last 12 months, did **someone in your family go to jail**?

##### **Death**

During the last 12 months, did a **close friend die**?

During the last 12 months, did **someone in the family that you loved a lot die**?

During the last 12 months, did a **pet of yours die**?

##### **Family Environment**

During the last 12 months, did your **parents argue more than previously**?

In the last 12 months, did a **new brother or sister arrive in your home** (because one was born, or one moved into the household)?

During the last 12 months, did a new **stepmother or stepfather move into your house**?

During the last 12 months, did you get **seriously sick or injured**?

During the last 12 months, did a **family member** (not including you) **have a mental or emotional problem**?

During the past 12 months, was **someone in your family seriously sick or injured**?

*Appendix 5*

**Child Maltreatment Questionnaire**

<b>Maltreatment Type</b>	<b>Question</b>	<b>Rating that met criteria</b>
Physical abuse	1. Hit you with something like a belt, brush, a stick or some other hard object?	2 or more times
	2. Hit you with a fist or kicked you hard?	1 or more times
	3. Beat you up very bad?	1 or more times
	4. Hurt you so badly that you were cut, you had bruises on your body or you had a broken bone or something like that?	1 or more times
Sexual abuse	1. Has an adult or another kid older than you ever tried to force you to look at or to touch their private parts?	1 or more times
	2. Has an adult or another kid older than you ever tried to touch you, grab you, or kiss you in a sexual way, or had done something sexual that made you afraid, bad or used?	1 or more times
Neglect	1. Left you alone, even when an adult should have been with you?	2 or more times
	2. Left you without food you needed?	1 or more times
	3. Did not take you to a doctor or hospital when you needed it?	1 or more times
	4. Been so drunk or high on drugs that they could not take care of you?	1 or more times

If an individual answered positively a question within a category, then they met the criteria for that category. Questions could be answered: never (0), once (1), 2-5 times (2), more than five times (3)

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